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To My Alma Mater.

"This fond attachment to the well-known place,
Whence first we started our life's long race,
Maintains its hold with such unfailing sway
We feel it even in age, and at our latest day" (*Cowper*)

Hail my *Alma Mater*
And of thousands more,
Earlier, now, and later
Nurtured on thy lore
Of mighty thoughts and words that aye to heaven soar.

Withered form and weakness
Mothers reach through pain;
Till in mortal meekness,
Mid our wailing vain,
They breath their spirits forth and turn to dust again.

But though, youthful ever
Art not suckling-worm;
Time and care can never
Taint the heaven-born;
Thy strength is more and more and fresh as in the morn.

Oracle of learning
That hast ever been,
To thy alter burning
With a sacred sheen,
I came to sacrifice with deep-devotest mien

Thro' wearing distance
From the northmost land,
Seeking thy assistance
I came and joined thy many-raced band.

Deep we drank the honey
Like the humming bee;
Like swallows, lands more sunny
Seeking, such were we;
High and higher soared we, as larks above the lea.

Thus I passed in gladness
A scor[illegible]f months and more,
In the ecsta[illegible]iness
Of amazing lore
No cares I felt nor langour, but joy for ever-more.

Like a favoured maiden
From her parents' care,
Passing sorrow-laden,
With no help or rare,
To her husband's lordly roof, new joys and woes to bear.

Like a rich bark sailing
From her haven-home,
With a heart not failing
Nor secure, to roam
In quest of gain or fame, upon the dangerous foam.

Now I leave thy altar
And thy prophets kind;
May I never falter,
Ever may the mind.
Which thou hast formed and stored, now boldly brave
life's wind!

Bless me, noble mother,
Ere I from thee move;
For as that dear other
Whom I love above
Adore for gift of life, so truly I thee love.

Many a foot more worthy
Thy great halls may pace;
Many a name more worthy
May thy records grace;
In loyal love of thee I yield to none first place.

Hail my *Alma Mater*
And of thousands more,
Earlier, now, and later
Nurtured on thy lore
In mighty thoughts and words, grow thou for ever more!

(N. S. V.)

The Tatler's Diary 1940—41.

1940.

June 15. The college re-opens.

„ 16. Some students begin their studies, saying that University examinations are fast approaching.

„ 20. Ramasub arrives after his summer slumbers.

„ 25. The date of election announced by the Vice-President.

„ 27. The day of election. There is not much pestering by candidates as on previous occasions. Co-operation is evidenced among the students by nearly all the candidates being elected unanimously.

July 2. The first year students arrive.

„ 13. College Day Sports. Mrs. K. M. Unnithan distributes the prizes.

„ 15. College Day and Conference opened by the President, Mr. S. V. Ramamurthy, M. A., I. C. S. The prize-winners receive their prizes. Mr. G. Rama Rao bags four prizes open to 2nd year students amidst great applause.

„ 16. Entertainment.

„ 17. The College-Day comes to a close.

„ 18. Mr. A. R. C. Westlake, Director of Agriculture delivers the Inaugural Address of the Students' Club.

„ 25. A happy coincidence. Mr. Ramana Rao buys a cycle from Mr. Ramalingam for a modest price of Rs. 5 preferentially given to him by Mr. Ramalingam rejecting a more handsome offer from the buyers of scrap iron. Mr. S. V. Sreenivasan buys a Tomco washing soap saying to by-standers ' Live Labour, Die Dignity '.

„ 27. Some students start on a literacy campaign. Ramasub is busy arranging for their conveniences. They arrive back and find that it is not worth the trouble after spending each one rupee.

August 1. Mr. Achutharama Raju resigns his mess representative-ship.

„ 5. A debate was held under the auspices of the Students' Club on the subject " Whether girls can be admitted into our College ".

„ 19. An emergent General-body meeting of the Students' Club was held to pass a resolution " That sincere and heart-felt wishes be offered to Mr. R. C. Broadfoot our beloved Principal for a successful operation, a speedy and complete re[illegible]ry and a safe return to the College to resume the office of the Principal and to guide the destinies of the students of the College whom he has treated with

consideration, sympathy and affection ". Mr. Broadfoot leaves for Madras and all the students assemble at the station to see him off.

" 30. Sri N. Subramania Iyer talks on " Co-operation and Agriculture " under the auspices of the Students' Club.

Sep. 3. Second year of War begins.

" 5. All the students are busy with their books for the September examination.

" 6. Ramasub finds no time to spare for books, as he is busy preparing himself and his kit for the tour which begins on October 1st.

" 11. Examinations begin.

" 13. Third year students go home for Michaelmas.

October 1. Third year students start on tour headed by Sri. Unnikrishna Menon, Senior Lecturer in Agriculture and Sri. T. Nataraj, Asst. Lecturer in Agriculture. Rao Bahadur G. N. Rangaswami Ayyangar, Principal and Sri. P. A. Venkateswaran, Warden go to the station to see them off.

" 2. After a pleasant journey, Mr. Ramana Rao opines that it will be more enjoyable, if we had also a Chemical tour at the end of this Agricultural tour.

" 3. Mr. Vasudeva Rao, S. V. Sreenivasan and C. V. Ramanamurthy joined the party at Gudiyatham station when the party was leaving for Kodur.

" 8. Mr. Raju marches to Hagari station. His sandals get a happy burial in the slushy black-cotton soil after faithful service for 8 years and were heard to say just before they sank into the mire " Thank God ! we have escaped a tyrant and a hard task master."

" 9. H. E. the Governor of Madras visits the College.

" 10. Third year students are busy in a Bellary choultry.

" 12. While Ramasub and Venkataramanamurthy were walking in Cubbon park at Bangalore after a delightful tea, some film fans mistook them for Laurel and Hardy come on a visit to India.

" 14. Dr. Ida Scudder, Principal, Women's Medical College, Vellore addressed the students of our College on " The adventure of Vellore Women's Medical College."

" 15. While all the students interest themselves in knowing about the farm at Hosur, Mr. Somanna gets training in cooking.

" 16. The third year students return after the tour. The Principal meets them at Podanur Station.

" 19. Ramasub, Achutharama Raju and [illegible]bamurthy seem to be indisposed.

" 20. They develop malaria.

Oct. 21. A general body meeting was held to discuss some points with respect to our new Club building.

„ 23. Mr. Narayanamurthy of the final year class observes silence for three hours praying for the happy recovery of the malarial patients.

„ 24. All improve miraculously.

„ 28. Second year students start on their grand tour to Tudialore lasting for 4 hours.
Mr. Basappa is busy. The reflection came to us—poor creatures—probably they may not have any other tour on account of the War.

„ 29. The Hostel experiences a miniature bombing in the explosions of crackers. Mr. G. Ramalingam suggests that civilians should be spared at least in this bombardment and should not be made to run out of their rooms.

„ 30. Deepavali.

Nov. 13. As in previous year the Inter-Collegiate competitions in Hockey, Cricket, Foot-ball and Athletics among Colleges in The Bangalore Zone were held at Coimbatore on the Agricultural College grounds.

Dec. 2. The Bangalore division final Hockey match is played at Bangalore against the Ceded Districts College. Our College unfortunately loses by one goal. Mr. H. Shiva Rau, Vice-President accompanied the party of players to Bangalore.

„ 4. Under the auspices of the Students' Club Sri. N. Krishnaswami Iyengar, B.A., B.L., Sub-Judge, Coimbatore delivered a lecture on "Advice to Students" with Rao Bahadur G. N. Rangaswami Iyengar, the Principal in the chair.

„ 18. Selection Examination.

„ 21. Christmas vacation begins.

1941 Jan. 3. Second year students start on an educational tour to southern Districts.

„ 4. College re-opens after the Christmas and New Year Holidays.

„ 17. Second year students return from their tour.

„ 23. Rao Bahadur T. S. Venkataraman delivered a lecture on "Indian Village and our duty to it".

„ 24. Mr. A. J. Macdonald, B. Sc., B. Sc. (Agri.) N. D. A., Officer in charge, Poultry Research Section, Imperial Veterinary Research Institute, Izatnagar delivered an educative and thought provoking lecture on "Poultry Farming in India" with Sri. K. Unnikrishna Menon in the chair.

Jan. 31. Under the auspices of the Students' Club Sri. N. Lakshmanan delivered a lecture on "Creative joy through dancing.

Feb. 3rd, 4th and 5th. The Maharajah of Travancore Curzon Memorial lectures were delivered by Dr. M. Damodaram on the subject of "Nitrogen metabolism and feeding of plants and stock."

10th. The Annual Essay Competition was held in the Freeman Hall the subject being 'Why India should participate in the War.'

Evening—Elocution Competition was held under the auspices of the Students' Club—the subject being Sir M. Visweswarayya's saying 'Industrialise or perish'.

17th. Inter-tutorial Elocution competition was held.

22nd. Club Day celebrations.

23rd. Students begin serious preparations for the examinations.

The turning point.

Three Precious Years.

IT was three years ago that we, the senior-most batch of students, at present in the hostel, came here. We felt that the place was quite beautiful and healthy and that we could spend the prescribed period of three years as three days. The three years are over even much quicker than three days. As we think about it, we recollect with sweet memories the events of the past three years. We wish that the days should have been longer, as the period spent here is being felt to be too short now, on account of its pleasant and useful nature.

The special feature of this place is the congenial climate. The cool days make us feel happy always and keep us healthy too. The view of the cloud-capped beautiful blue mountains on the north with the rays of the sun illuminating them gives much pleasure to all observers of natural beauty.

The field work which is a special privilege of the students of this College, kept us in good health and spirits all along. Going out early in the morning with a sickle, basket, bag, hoe, *mammotti* and working in the morning sun in company with friends is one of the happiest things for any lover of nature. Let alone the acquisition of knowledge in practical agriculture by such work; we learn much about the oft quoted phrase, 'Dignity of Labour'. The truth of the saying that 'work is pleasure' can never perhaps be more thoroughly verified than by doing some field work. The happiness that we derive by resting awhile after a strenuous spell of work can never be imagined by those working only at the desk.

In addition to the above advantages, we gather much useful knowledge in the different sciences. We feel confident that we are well equipped for the battle of life, in spite of the fact that the science of Agriculture is too complex to be mastered except by long and hard experience.

We are here in the company of students and teachers. The hostel consists of students with different languages, customs, manners, religions, tastes, habits and talents. Perhaps nowhere can a sense of tolerance and friendliness be better developed than in hostels of this kind. So far we have been very happy and carefree here on account of the warden and others looking after our welfare and our hearty thanks go to the warden and his staff. We shall be considered to have become experienced enough and shall be expected to hear patiently about what others want of us. The usual reluctance to studiously avoid any thing against our taste has to be gradually given up. The gravity of

responsibility falls upon us. We have to get on in this world hereafter not with the gay light step of the student but with a heavier step and a slower pace.

We are not sure whether we shall be able to renew in person the acquaintances of people residing in different places, when once we leave this College. This is another thought that fills our mind when we think of how it looks when we enter life. The hostel consists of members that come from all parts of the Presidency from almost all the districts. Oh ! what a wide representation. The hostel appears better represented than any legislative body. But, fortunately, here not a single problem exists which troubles the outside world so much. There is no minority problem and no communal tension. Perfect equality prevails. All the members have equal rights. The Governor of this small representative body is our Principal. He is not confronted with so many problems as H. E. the Governor of Madras, because big problems never arise in this Province and even if they make their way in, they will be easily settled. The minister for food and welfare, our Warden, is much respected. The Government that prevails is not a crushing autocracy but a benevolent one. Though the authorities have rights of vetoing, the occasion for the use of special powers never arises. We replaced the old members when we came in as freshers and the coming batch soon fills our place. " The old order changeth yielding place to new ".

We go out, as we have to, but with a much disturbed heart. The part of life so far led by us is of course the golden age of our lives, as we have been care free and happy all these days. We do not know how well we can face the knotty future and its knottier problems. It is not even the problem of life that confronts us now but the problem of how to harden our hearts and depart from our dear friends and revered teachers in this sacred *Alma mater* of ours. We depart but our attachment grows stronger with the distance that separates us. The events and memories of these three happy years, the men with whom we moved here will ever be green in our hearts and may it help us in future to spend a few happy moments now and then by reminding us of our old days here.

M. E.

Superstition.

SUPERSTITION is a faith or an article of faith, based on, ignorance of ideas regarding the deity; a practice or observance founded on such a belief, regarding supernatural phenomena! Superstition is in-born in man—no man or woman being entirely free from it. It is only a question how deeply superstitious one is.

Superstition has its votaries from among all classes and a faith so widely extant among the peoples of the world, must have that "mysterious something" about it, which the human imagination cannot solve. After all what precious little do we know of the "Mysterious universe"!

Cold logic and reasoning dismisses superstition as a matter on which no sane man can possibly pitch his faith, but logic like statistics often gives a wrong impression of the true state of affairs!!!

There are, however, certain observances by certain individuals or class of individuals, which make others 'laugh and grow fat'.

How is a live cat worse than a human corpse? Can a Hindu have peace of mind for the rest of the day, if he encounters an ordinary domestic cat on his way to an important engagement? How elated he feels if he sees a dead body carried on a bier, instead of seeing a cat? How does a dead body bring man more luck than a living sprightly cat?—Similarly, a bundle of fuel, a solitary Brahmin, a red *sari*, a poor widow and etc., etc., all come in the 'Cat', class.

Isn't it a sign of lasting good luck for the day, if you should see the first thing in the morning—a jackal? But alas! jackals are rare, and rarer still as objects to be seen first in the morning at a convenient angle, as you get up from your bed. How does a jackal bring you success when the cat fails you miserably?

A particular day of the week is more auspicious to some, while the same day is inauspicious to others. Why? Even the different hours of the same day hold in store for you different intensities of good and bad luck. How wonderful and illogical must have been the Creator to have ordained it so!

No. 13 and a broken mirror are harbingers of bad luck to an Englishman. How does an ordinary number and a broken glass affect the life and destiny of a man? For my part, I should certainly like to own 13 lakhs of rupees instead of twelve or a broken mirror instead of none.

There is nothing more repulsive to a Hindu than the sight of a poor widow. Are we not adding an insult to injury to the poor helpless being, who is already stifling under the unredeemable loss of her only solace—her lord, her husband? Why should the sight of an elderly lady, who should be all the more revered,—be so abhorring? Is it not a case more worthy of human pity and sympathy than abhorrence?

A friend of mine, a distinguished cricketer remained unbeaten, in a practice match after compiling a huge score. The next day he had to play a first class match and he appeared in the soiled clothes he wore on the previous day. He asserted that he was careful enough not to exclude even his cricket shoes while going to bed, lest he should miss his luck that had stood him in good stead. Was it not a great disappointment to him to be dismissed for a duck after wooing so carefully and with such great trouble the mistress of luck?

Then there are people who go to races with a particular suit of their favourite colour, which they believe is the forerunner of luck. Is it not an insult to our intelligence that a particular shade of our clothes or something of the kind should make a dud horse win because we have backed it? It is hard to believe,—and if we believed it is a shame for humanity, that the great order of things can change its course by a fanciful man wearing odd old clothes of a particular colour. If they could, would not the great universe come to a standstill?

But a thing so universal as superstition must indeed be a factor that cannot be easily set aside or ignored. Apart from all the baneful effects that it primarily has, it acts wonderfully in every-day life. A man setting out on an errand or a task meets with some favoured object or thing which he believed to be lucky. And this little encounter gives him some occult power and necessary fillip and he goes out with renewed zeal and zest to see himself through. Thus it adds an extra 'something' to him. The reliance on the supernatural is one of the sources of power in men of blind faith. But superstition is not without its reverses and disappointments. It is often a dead weight that sits heavily like a vampire on our chests and suffocates us almost to death.

We see before our very eyes a great array of men pass into the unknown, but none returns to tell us what is beyond. We plod endlessly, from day to day, into a future that stretches before us like a wall of impenetrable darkness, that we could almost touch but never overtake. But this endlessly alluring theme—superstition, takes us beyond the grim mask of the present and gives us an imaginary view of the future stretching before us. Wonderful indeed!

How do these superstitions come to stay with us? Through mere force of habit, a lack of the spirit of questioning; lack of eagerness and curiosity of the intellect. These shadows of the past have got established and a man who challenges with his rational criticisms, encounters the risk of being suspected as an evil genius running amok.

An ultra modern man may not believe in past traditions, customs and conventions, but has at least that savage philosophy—superstition to a degree. The most civilised man of the Occident is no less susceptible than the man of the mysterious Orient. It exists in some form or other, everywhere and with every race.

Superstitions are thus many and various. They are both a habit and a fancy. Reason takes a holiday while you are under their fanciful embrace. It is a disease of the human mind which dims our faith and is infectious. Does that mean that it is a dark spot on an otherwise brilliant surface and the most civilised among us is still a stupid victim to ignorance?

M. R. Mohan Punja.

Is it a Fact?

That Mr. Sambamurty, enquired as to why the *nets* are not put up during cricket matches.

That the Research Engineer has asked for the cycles of the following gentlemen to serve as models for the tractors he proposes to design. Thyagaram's for trackless type. Prabhakara Reddy's for pneumatic type. Ramana Rao's for heavy soils type. Mahimai Dass' to serve as raw material for the above.

That the first year students are circulating a subscription list to buy a Radio set for Messrs. Baig and Venkataraman so that the Club Radio may be available for the use of other members.

That block-boy Pannikar has so far saved one tin of kerosene oil for the Hostel by putting out the lantern whenever the Warden gets into a room and lighting it again when he renews his rounds.

That Mr. Ali Khan is seriously thinking of starting a Poultry Farm taking advantage of all the *ducks* he has scored during the last cricket season.

That Mr. Ibrahim Ali in a recent Foot-ball match got a serious wound in his *hind* leg.

That emerging out of the Nutrition Research Laboratory, asked as to who Aykroyd was, Mr. Srinivasa Rao was ready with the answer that it was another *gland* akin to Thyroid.

Is Life Worth Living ?

"Had I but served my God with half the zeal
I served my King He would not in mine age
Have left me naked to mine enemies". *(Shakespeare).*

It has been said that advances in science have effected a complete revolution in religious thought. Discoveries in every branch of Science have transformed human life beyond recognition. Knowledge has been accumulated in a way never before dreamt of, vast conquests have been made over pain and disease and each day we are adding with the aid of Science to the sum of human happiness. Everything points out to the intellectual supremacy of man. Such being the age in which we live, is it any wonder that a cheery optimism, devoid of faith in a life beyond this life has become the creed of most scientists? And yet, paradoxical though it may seem, side by side with this optimism there is noticeable a most distressing form of pessimism, which seems to be the result of eliminating the religious element. The theologian bids us repent and waste our life for past sins and in tremulous hopes that the past may yet be the future. Science tells us that what is gone is gone and that the best wisdom of life is the acceptance of accomplished facts. Such is the supposed creed of science. Belief in another life is according to Science but a mere delusion and a figment of theology. There can be no repentance, since that only leads to vain regrets and needless pain. Such a creed is merely a refined modern interpretation of the very worst type of fatalism. The modern apostles of this creed when asked the question 'Is life worth living?'—would unhesitatingly answer Yes! But if the question were pressed further and they were asked—why is life worth living?—Is it worth living because of the individual pleasures it yields, or of the general happiness it affords, or life is an end in itself, the answer in the majority of cases would be that life is worth living, because if well used it will lead to a moral bettering of the world. These are keenly alive to the transitory nature of life. But admitting all these they would still affirm that life is worth living.

The optimists of the present day who have no faith in a life beyond the present can be brought under two classes. The first includes those who adopt the lower ideal of human life and the cultivation of faculties as the *summum bonum* of life. They take refuge under vague ideas as are conveyed by the expressions "cultivation", "progress" etc. without making any reference to the ethical side of life. At the head of this class of optimists must be placed the great German poet and philosopher Goethe. No writer has laid such stress on the bright and joyous aspects of life as Goethe. "Open your eyes"

he cries "Ye are not required to search for the good in the far distant; it is here if ye will but grasp it. Learn to find joy in existence giving yourself up to the glory of Nature and that higher glory of Nature which is revealed through the products of genius;—do this and ye will discover that it is good to be in this world."

There is no doubt that there is something stimulating in this kind of life-teaching. It is but right that man should see and appreciate the joyous aspect of human life. Not only the starry heaven above but the meanest object that we tread under our feet affords food for our joyous contemplation. Of course we admit all this but a little reflection will show that the end in view placed before us by this class of optimists can by no means be looked upon as final, an end in which we can find rest and satisfaction.

The philosophy above propounded makes no provision for the majority of mankind, who do not belong to the cultured class—those that toil and suffer and are nursed in the lap of adversity. So this gospel of life cannot claim to be universal, however attractive it may appear in poetry and fiction for the cultured people.

Another flaw in this school of thought is the pessimism that lurks behind the assumed optimism. Take for instance Byron. His poetry too, mirrors in striking splendour, all the glories of life. Byron was consistently true to nature, but what was the consequence? His optimism ended in a most dreary type of pessimism He sought his ideal in society, history and political freedom but he failed to get any satisfaction and fell back on the positive and actual. Everywhere he found nothing but a cry of anguish, wrung from the heart's core.

"One desert
Barren and cold on which wild waves break
But nothing rests, save carcases and wrecks
Rocks and the salt sea, weeds of bitterness"

This then is the outcome of the optimism of Goethe, when carried to its logical conclusions.

Now we come to the second class of optimists who attach the greatest importance to the ethical aspect of life. To this class belong modern thinkers like John Stewart Mill, Herbert Spencer and others. These people lay the greatest stress on the importance of virtue, the dignity of life and earnestness of the moral struggle. The majority of thinkers of this positive school are utilitarians. The *summum bonum* of life according to them is the greatest happiness of the greatest number. They say an act is right if it leads to this end. In the first place the upholders of this theory are inconsistent in rejecting 'individual happiness' as an end and substituting instead the happiness of the multitude. They resorted to this in order to clear themselves of the charge of selfishness brought against their view of morality.

Secondly the test of 'inwardness' is inapplicable to this view of morality. We call a man wicked if his motives are wicked, no matter where his acts lead to. If happiness is the standard of virtue, morality loses its absolute character altogether. But far different is that moral system backed by the belief in a personal God and in a personal immortality. Instead of man's immediate happiness as a standard of virtue substitute God's will. The thought that we owe our existence to a personal God to one whom we can address as "Our Father" who can read the very secrets of our life—such thoughts undoubtedly place the relation in which we stand to our fellowmen in an entirely new light. It has been very well said that "It is only from the filial relation that the paternal springs." Nothing but a belief in a personal God can give a logical and full account of the true nature of moral ends. Man helpless as he is, bound down to lower aims by ties of self and sin, can never hope to have his higher aims realised, unless he trusts himself implicitly to the Power that works all things. Life is not worth living unless it is spent for others and in bettering the world and all our efforts to improve this world will end in emptiness if we are not sustained by a belief in a personal God.

N. Srinivasulu.

Believe it or not.

Mr. P. K. Sivasubramanyam mistook the turf bowling pitch on the college maidan for a tobacco nursery.

Mr. Kanakarao does not get straight furrows in ploughing because of the frequent intervention of Konda the Farm coolie.

Mr. P. V. Ramanamurty affirms that there is an *alf-alfa* cream separator in our Dairy.

Mr. Gona Rama Rao says that every Botanic garden should have a *crockery* for growing its Xerophytic specimens.

Mr. Yakub Sha believes that *vaseline* is used in embroidery.

Mr. Tiruvegatachary consumes only 15 lb. of tomatoes whenever that dainty is on the menu.

Mr. Panda never fails to hear any Carnatic music broadcast from the B. B. C.

Mr. Devadass Kamath's voice has been expressed by a mathematical formula as being inversely proportional to his size.

My First Cricket

FEW of the human race realize that the eminence they attain in life is not acquired in the cradle. Many a young man resorts to ridiculing his companions, accuse them of laziness merely for the reason that they are not competent enough in the particular occupation in which he is an adept.

Goaded by my adventurous comrades who were unmindful of the saying that " a little knowledge is a dangerous thing "' I offered myself to run the risk of playing the hazardous game of cricket in one of the local matches. I spent sleepless nights awaiting the day of my impending trial. At last it came. Clad in khaki shorts I rushed to the field with a half consoled stomach. A strange man in a strange group of anglicised Indian youths in white pants. The misfortune to be on the fielding side and bake in the scorching sun had fallen to my poor lot. One by one the battalion of eleven strong men now emerged out of the pavilion.

The game began in right earnest and I was directed to a remote corner of the ground to keep watch on the ball. A miraculous capture of the three wickets at either end of the pitch—and so soon! The game of cricket—a funny thing to behold! Standing in the field I fell into a reverie when suddenly a ball rushed towards me. I hesitated to touch it for fear of being hurt but pride prevented me from leaving it. Pouncing upon the ball I stretched my hands but to no avail. It escaped between the legs and turning round I saw it already several yards ahead of me well on the way to the boundary line. Ah! what a degradation! A rattling noise from behind; a terrific hooting from the pavilion; a contemptuous grin from the field. Yet I remained cool, calmly picked up the ball and threw it back to the wicket keeper. The very next moment I was driven away to a distant corner, a more skilled man usurping my former place. Little was I perturbed. The next ball that came failed to escape my firm grip. What a delight! a score of voices shouting " well fielded " Suddenly a change was wrought because of my meritorious services; orders were issued to guard the ball from very near the player; a position which I had thought to be as high and safe as that of a Duke. But my fears increased when I began to think of the dangers in that near position. Fearing the wrath of the chief, I ventured to check as many balls as I could, but only to please a few and displease many. After four hours of unceasing torture in the scorching sun, I returned to the pavilion with the rest, silently resolving within myself to give a real trouncing to our opponents.

Although disappointed to the core of my heart on finding I was to be only the last man to bat, I entered the field in due course with all the usual regalia. How ugly the body appears in pads and gloves! I was hardly able to walk to the pitch with the additional burden of a cricket bat. The preliminary rites at the pitch were all finished somehow and I got ready to offer a firm stand in defending the three sticks, where my predecessor had fallen bleeding. The first ball! It came with a lightning speed. With unflinching courage I rushed forward to meet it. Hush! a shriek from behind startled me: I turned round only to behold with grief my own downfall!

Thrown into inconcievable depths of despair, I returned to the pavilion amidst sarcastic gestures and derisive shrieks. Thus the insatiable ambition of a youth to quench the thirst for public applause received a violent set-back in its infancy itself.

New Year Resolutions.

S. V. Srinivasan.	To take practical tips in table tennis from eminent players of the Officers' Club and thus secure this year's honours in that game.
G. Ramalingam.	To put in at least 8 hours of effective mugging every working day.
Mr. Hegde.	Not to participate in any out-door games in view of his indifferent health.
Gona Ramarao.	To equip himself in such a way for the exam that he might smash all previous records, especially those of Mr. Sankaram.
C. Sankara Rao.	To run round the maidan twice daily so that he may be more swift in running between the wickets.
Ramaswami and Sridharan.	To attend classes regularly.
K. Sambamurty.	To keep himself in readiness with bundles of typed materials etc., for accepting the schoolmaster's post likely to come his way in 1943.

Random Notes.

OUR child, the literacy campaign, nursed by our exalted Warden, would have become great, had it not been killed before it was born.

The leader of the ill-fated campaign perversely pitched upon a site inevitably involving transportation by bus or taxi and consequently the exuberant volunteers flocking '*enmasse*' for the sheer picnic value of it were uncontrollable. It was not with that idea the suggestion was thrown out. The compaigners could as well have served the folk of the adjoining village Pujaripalayam, who we feel sure, are not so literate as the Agricultural College students.

* * * *

The Secretary of the Students' club declared in one of the momentous gatherings that it is clearly not one of his duties to go round and collect students on the eve of every ceremonial occasion. We sympathise with the Secretary for the underlying principle of individual discretion, advocated in spite of the risk of unfortunate speakers dealing with inanimate audiences.

* * * *

But you are supposed to be generous. Why not give a lift to all the 'glass rods' in the hostel on your cycle? However there are certain exceptions whom you cannot try to carry without the fear of colossal disaster to your machine. Purchase a good double bullock cart on behalf of the Club. Golden opportunity Ye! gentiles, Ramana Rao and Rama-Sub.

* * * *

The popular cry at the budget meetings every year is that the demands of Cricket dominate the expenses of other club activities. Well, it calls for a clear revision of procedure. But do you want to deny us the privilege of rapidly gaining fame for our college and hamper the dynamic momentum with which our players top the Presidency standard? No.

Those dis-interested gentlemen—a special contribution of Agricultural College—racking their brains in the rusty books of the neglected library rooms can well keep out of the ventilators and get a view of the Cricket matches going on. Don't be frightened by the high class ducks scored. All indigenous! You can start a poultry farm.

* * * *

A smart first year student going through the final year's Agricultural paper, with characteristic impunity suddenly exclaimed "Bah!

does it really require three years' study to know how many birds are required to supply 100 eggs per day? 100 pullets and 100 cockrels to mate them. Where is the difficulty!"

* * * *

Interesting revelations were made in a recent debate regarding the uniform of the lady students who may join our College. A speaker seems to have been in intense perplexity whether after all, this would not stand in their way.

* * * *

An agricultural student of the first year class, at the end of an interview with an actress, exclaimed with a hint of modesty, 'Madam, I am sorry, I am cockroaching on your time', The lady gently smiled correcting him, it is *encroaching* and not cockroaching. The man blushed "I did not think it very necessary to stick to genders in this College, where English is not a subject. How-ever, I should have said, 'hencroached' when speaking to ladies".

Looker on.

Some Facts that you would be interested in.

In the Bellary tract you will find 8 pairs of bullocks working *behind* a *pedda madaka.*

Field No. 37 is meant for the cultivation of Students.

The original home of India is Sugarcane.

The entire nebulous mass is comparable to a tennis ball, hockey ball, tennikoit ball or any ball.

Cobras are used for digging Hariali grass.

Zuiderzee is a rivulet of Zambisi in Australia.

Jennet is another name for rennet.

Peru is famous for Chilean nitrate.

The activated Sludge plant is slowly coming into cultivation.

Sesamum indicum is the eucalyptus tree.

Vigils and bigils are used in refereeing foot-ball.

Gunga.

THE morning dawned in unclouded splendour. The limbless charioteer ARUNA had come far up in the sky, announcing the advent of his master *Dinaker*. Dinaker was peeping through " the rolling mountains ", now appearing and now disappearing, flashing his bright smile over the dancing waves with foams scattered like pearls hanging in the sky.

It was the *Vaisaka Amavasya* day. People from far and near had come to bathe in the sea, and purify themselves. Many children were playing near the breakers, but as the waves rushed on they fled back to their parents. Some school-going students who boasted of their swimming ability were trying to exhibit their prowess before beautiful belles bathing near by.

All of a sudden the wind began to blow stronger, the clouds began to thicken, the waves began to thunder and being terrified, the birds twittered and flew helter-skelter. All began to rush to the shore.

There was an ear-splitting shriek from a corner. I rushed to the scene. I saw an urchin caught in the current. I waded and swam through the water and caught hold of him. All of a sudden I heard an uproar, headed by my father's thunderous voice. ' It is Gunga, the Pariah boy. Leave hold of him. Are you going to pollute yourself ? " I was confused and let go the boy's arm. There was a mighty swoop, a wave came and the boy was carried away. I turned back. The two imploring eyes of the mother were looking at me with contempt. I made another attempt to save the child, but it was too late. The waves had carried him far out of my reach.

I slowly turned back, I dared not look at the face of the mother, nor at the faces of my own people. All were looking at the sea with a " philosophic calmness ".

After an hour the body of Gunga was slowly washed ashore. The mother of the boy rushed to the spot. There was not a drop of tear, but she looked, looked at her dear son's face. The strain was too much for her. She suddenly collapsed.

I wanted to go near the woman, and help her. The terrible look of my parents non-plussed me. With a sullen look I slowly returned home all the while thinking of the poor boy and the helpless mother.

The night came. I could not sleep. The ghastly face of the boy, the tender, pathetic face of the mother began to haunt me. She was carrying the boy in her hands. She laughed a ghastly laugh and seemed to say " Are these the social customs that you are proud of ? You are a coward, a murderer. You are responsible for the death of my son."

I woke up. But there was only the darkness mocking at me. I saw the shining stars twinkling, making faces at me. *S. B. Pezavar.*

Holy Badrinath and My Visit to the Sacred Shrine.

BADRINATH, the dreamland of 'Bhakthas' and the fairy-land of travellers and mountaineers is situated in the heart of the famous Himalayas, the king of mountains and pride of India. The place is surrounded by lofty mountains and snowy peaks with a back-ground of awe inspiring scenery. The altitude of this place is about 11,400 feet above sea level. And here where Nature's glory is exhibited in multiple forms, is situated the beautiful little temple of Badrinath. The Lord is seated in the *Yoga* posture inside this shrine. This temple is considered to be the most sacred in India... and it is the ambition of every Hindu to offer his respects to the great Lord Badrinath at least once in his life time. Though this is the dream of thousands, circumstances favour only a fortunate few in the realization of their dreams. Here, I am proud to include my name among the fortunate few.

There is a hot spring (122° F.) known as 'Tapta Kundam' the water of which is said to contain valuable healing properties. But for this hot spring any pilgrim to this place will feel reluctant to take a bath in the ice cold water of the mighty *Alakananda* river. It is a heavenly pleasure to take a bath in that hot spring of Badrinath where the weather is extremely cold.

Few can resist the temptation of visiting this place when they come to know about the greatness of Badrinath, the Himalayan grandeur and especially the foot-path leading to Badrinath. The path runs on the bank of the roaring *Alakananda* which has a snake like curling course in the deep valleys amidst lofty mountains and the snow clad peaks afar.

When once we step into the enchanting regions of the famous Himalayas, we forget all our worldly worries and immerse ourselves in the happiness of enjoying the choicest beauties of nature which we see round about us. On our way to Badrinath we meet with the inhabitants of those regions. They are all very fair-looking, wearing cheerful smiles, and have well built bodies and rosy cheeks. They lead an extremely simple life. They are indeed the real children of nature, the wonderful pictures of health and happiness, who reflect in their guileless countenances the love of the creator. 'Their best companions are innocence and health and their best riches are ignorance of wealth',

The temple at Badrinath is open only for six months in the year. The other six months the whole place is covered with snow. The

place becomes habitable only from the first week of May. Though the temple is open between May and October, the best months for making a comfortable journey are May and June. We see during these two months, pilgrims pouring into this place in thousands. Pilgrims from all over India (from Kashmir to Cape Comorin) visit this place. It is very interesting to see people with different modes of dresses, complexions, peculiar customs and manners at the same time in a place like Badrinath. We see people who are lame and old and sickly women and children along this journey with a buoyant spirit and bubbling enthusiasm. It is the immense faith in the Almighty that makes all these pilgrims visit Badrinath walking a distance of about 190 miles, all the way from Haridwar to Badrinath. We never feel the tiresomeness of the journey. After walking a distance of 12 to 15 miles a day, we get very good sleep in the night. In the morning, a refreshing bath in the ice cold waters of the Ganges makes the pilgrims fresh and buoyant for that day's walk. We have to spend about 20 days in that happy abode of God and men, the famous Himalayas which combines the rugged grandeur with the delicate beauties of nature, for our journey to Badrinath and back. "Jai Badri—Bhisal"!!

S. V. Sreenivasan.

Latest Researches.

1. Alga is a legume.
2. Cambadicumbu is a strain of sorghum.
3. Colostrum contains collossal materials.
4. Standardisation experiments are those that are standardised.
5. *Kolingi* is a kind of timber tree,
6. Eggs are graded by the weight they contain.
7. A plot measuring 33′ × 33′ is one Guntaka (gunta) and 40 guntakas (guntas) make one acre.
8. 360 days make one year.

Tatler's University.

THE University was started in the year 1937 in Pujaripalayam by the present Raja of Pujaripalayam with a view to give higher education to his subjects. He constructed various buildings to lodge the Colleges, the University offices, and the convocation hall. However, this university is quite different from any other with which we are familiar. Many students are attracted from all parts of the country to study here and get their degrees. The students are carefree, 'happy-go-lucky' people. Of course there is a good library but nobody uses it. There are no examinations, no work, no attendance and no lectures. The student enrolls himself for a particular course. For each course there is a definite period of stay prescribed and the moment he finishes his course, he gets the degree. It is a common experience of all students to feel a great anxiety and botheration at regular attendance and examinations. But what a contrast we find in this University. For people who are anxious to know more of the courses conducted by this University, a few of them are given below :—

B. D.—Bachelor of Dullness—Extends for 2 yrs.
M. D.—Master „ „ — „ „ 4 „
D. D —Decidedly Dull „ — „ „ 6 „
Ph. D.—Phenomenally Dull— „ „ 5 „

The moment a student steps out of this University after finishing his course, he is welcomed and given a job according to his degree in the state departments. The degrees are very highly valued in the state. For details about the University, apply to the Registrar, Tatler's University, Pujaripalayam, Coimbatore, South India.

C. Srinivasan.

Students' Annual Club Day Celebrations 1941.

The Annual Club Day was celebrated on Saturday the 22nd February, 1941, with great eclat and enthusiasm. It was a day of triumph, merriment and unalloyed happiness to all of us. The sports and tournaments connected with it had been concluded earlier. The celebration of the happy day commenced with " Tea " at 4-30 P. M. The fancy dress competition provided great amusement to visitors. After tea, the guests and students adjourned to the tastefully decorated Freeman Hall, when a meeting was held with A. R. C. Westlake Esq., I. C. S., District Collector, Coimbatore in the chair. Students P. Paramananda Panda and Narasimham deserve great praise for the exquisite and artistic way in which they decorated the hall.

Prizes were distributed by the President after reading of the report for 1940—41 by the Secretaries. This was followed by an interesting Variety Entertainment which commenced with a song from student M. Ramalingam.

The pleasant function terminated with the presidential address. Sri Rao Bahadur G. N. Rangaswami Iyengar, Principal of the College, proposed the vote of thanks.

The following is the list of prize winners in the various events held in connection with the Club Day : —

Indoor games.

	Winner.	*Runner up.*
Table Tennis Singles.	T. K. T. Achari.	T. Venkateswara Rao.
„ „ Doubles.	S. V. Sreenivasan & Hegde.	T. K. T. Achari & D. Narasimhamurthy.
Carrom Singles.	Y. V. S. S. N. Murthy.	Ramakanta Reddy.
„ Doubles.	Y. V. S. S. N. Murthy & partner.	C. M. George & Panda.
Chess.	Sreethara Sastry.	B. S. Krishnan.

Sports.

Tennikoit Singles.	Ramakantha Reddy.	Picheswara Rao.
„ Doubles.	Ramakantha Reddy & partner.	B. Narasimham & partner.
Volley Ball (6)	Devadas Kamath's team	
Volley Ball (9)	Krishnamoorthy's team.	
Badminton Doubles.	Hegde & partner.	Krishnamurthy & partner.
„ Singles.	A. Subba Raju.	P. Venkateswara Rao.
„ Fives.	A. Subba Raju's team.	
Tennis Singles-	Unfinished.	
„ Doubles.	A. Subba Raju & George.	Hegde & Subba Rao.
Inter Mess Tug of War:—	Non-vegetarian Mess.	
Inter Class Relay:—	Class I.	

Scooping the Hockey ball:—1. D. Chinnappa Reddy. 2. P. Y. Chintamoney.
Ring round the stump;—1. K. R. Hariharan. 2. P. Venkateswara Rao.
Kicking the foot ball:—1. I. L. Narasimha Rao. 2. C. V. Govindaswami,
Bowling at the stump:—1. Ramesh Adyantaya. 2. J. P. Nageswara Rao.
Slow cycle Race:—1. D. Daniel Sundararaj. 2. A. Subba Raju.
Chatty Cycle race:—1. D. Daniel Sundararaj. 2. P. Venkateswara Rao.
Wheel barrow:—1. I. L. Narasimha Rao. 2. D. Chinnappa Reddy.
Leap Frog Race:—1. D. Narasimhamurthy & partner. 2. D. Chinnappa Reddy & partner

Blow Ball:—1. D. Narasimhamurthy's team.
Musical Chair:—1. D. Daniel Sundararaj. 2. C. M. George.
Three-legged race:—1. R. M. Sastry & partner. 2. D. Narasimhamurthy & partner
Fancy Dress:—1. T. Chellappa. 2. V. Mahimai Das. 3. S. N. Ramasubramanian.
Parlakimidi Cup for the allround sportsman:—K. M. Somanna, Class III.
S. V. Sreenivasan, Class III

Award of College Colours.

Athletics:—1. K. Narayana Kamath, Class III. 2. C. V. Govindaswami, Class I.
Cricket:—1. Monappa Hegde, Class III. 2. C. Sankara Rao, Class II.
Inter Class:—1. Victory Cup. Class III. Parnell Cup. Class I.
Cricket. Sri. K. M. Thomas's wards.
Hockey. „ do do
Foot ball. „ M. Kantiraj's wards.
Literary Competition—Elocution:—1. H. Gurubasappa. 2. B. Seshavatharam. 3. G. V. Raghavalu.
Inter-tutorial Elocution Competition:—Sri. B. M. Lakshmipathi's wards.
Essay Competition:—1. Seshavatharam. 2. N. Sreenivasalu. 3. A. Adivi Reddy.
Special cup for the best student artist:—Paramananda Panda.

UNIVERSITY OF MADRAS

B. Sc. (Agriculture) Degree Examination, April 1941.

FIRST EXAMINATION

Three hours] AGRICULTURE [60 marks.

Answer six *questions only.* Questions 1 and 2 are compulsory.

1. What are the factors that decide the agricultural seasons in a tract? Explain this with reference to the Coimbatore district. (12 marks)

2. Write short notes on :— (*a*) Black soil of Bellary. (*b*) Red soil of Malabar, and (*c*) Delta soil of Tanjore. (12 marks)

3. What is the importance of soil temperature to plant growth? Explain the methods by which this temperature can be raised. (9 marks)

4. What is the object of tillage? How can good tilth be obtained in a dryland field? (9 marks)

5. The method of farming adopted in the West Coast requires fewer tillage implements than those required in the Ceded Districts. Why? (9 marks)

6. Differentiate between 'preparatory cultivation' and 'after cultivation'. Give examples of after cultivation followed in wet, garden and dryland cropping. (9 marks)

7. Write short notes on one improved implement used in each of the following operations :— (*a*) ploughing. (*b*) sowing. (*c*) inter-cultivation. (9 marks)

8. A farmer possesses country and Cooper No. 11 ploughs. For what operations would you recommend these different kinds of ploughs in wet, garden and dry-land cultivations, giving reasons for your recommendation. (9 marks)

Three hours.] BOTANY [60 Marks.

Answer six *questions only.* Questions 3 and 6 are compulsory.

1. Give an account of the modifications seen in roots for performing functions other than fixation in the earth and absorption of materials thereform. (9 marks)

2. What are the following? Give one example for each and explain the structure by means of drawings :—

Syconium, Caryopsis, Pome, Silique, Loculicidal capsule, Achene. (9 marks)

3. Give a full botanical description of any grass that you have examined and summarise the characters of the family Gramineae. Mention the popular and botanical names of important plants of this family growing in South India. (12 marks)

4. What tissues contribute to rigidity in plants? Explain with sketches how and on what principles they are distributed in the plant organs. (9 marks)

5. Describe the structure of a typical ripe anther and state how the pollen grains are formed in it. Draw figures to illustrate your answer. (9 marks)

6. What are the factors concerned in photosynthesis? How will you demonstrate their necessity by means of simple experiments? (12 marks)

7. What are enzymes? Mention the different kinds and state how they act and help the plant in all its metabolic activities. (9 marks)

8. State briefly what you understand by the following terms:— *a*) water requirements of plants, *b*) intramolecular respiration, *c*) negative geotropism. (9 marks)

Three hours.] CHEMISTRY [60 marks.

Answer six *questions only.* Questions 4 and 5 are cumpulsory.

1. Explain the terms:— (*a*) Elementary qualitative analysis, and (*b*) Identification of an organic compound. In what essential respect does qualitative organic analysis differ from qualitative inorganic analysis? (9 marks)

2. Describe Kjeldahl's method for the estimation of nitrogen in organic compounds.

0·5 gm. of groundnut cake was used in an experiment. The distillate was received in an Erlenmeyer flask containing 10 c.c. of semi-normal sulphuric acid, 27·5 c.c. of deci-normal potassium hydroxide were required to neutralise the excess acid. Calculate the percentage of Nitrogen in the sample of cake.

1 c.c. of deci-normal sulphuric acid = 0·0014 gm. Nitrogen. (9 marks)

3. What are monosaccharides? Give three tests by which hexoses can be identified. How would you distinguish an aldo-hexose from a ketohexose? (9 marks)

4. How is glycol prepared in the laboratory? Give its important properties and uses. How would you prove that Glycol has the formula cH_2 OH. cH_2 OH and not cH_2 cH $(OH)_2$. (12 marks)

5. How would you prepare Benzene from acetylene? By what reactions is Benzene distinguished from the hydrocarbons of the fatty series? (12 marks)

6. Describe two methods by which chlorobenzene can be prepared. In what way does it differ from its aliphatic analogues? (9 marks)

7. Starting from Benzene how would you prepare Benzoic acid? Enumerate its chief physical and chemical properties and uses. (9 marks)

8. How is Anthracene prepared on a commercial scale? Mention its important properties, reactions and uses. (9 marks)

Three hours.] ZOOLOGY [60 marks.

Answer six *questions only.* Questions 3 and 5 are compulsory.

1. Mention the chief characteristic features of animals and plants. Discuss their inter-relationships. (9 marks.)

2. Briefly describe with sketches the structure and life-history of the liverfluke. (9 marks.)

3. What are the chief functions of blood? Compare the main features in the circulatory system of earthworm, cockroach and frog (12 marks)

4. Describe the feeding habits of the following animals:—
(*a*) malarial parasite, (*b*) leech, (*c*) praying mantis, (*d*) snake, (*e*) eagle, and (*f*) elephant. What structural adaptations do they show? (9 marks)

5. 'Though insects and man stand far apart in their status, there exist numerous intimate relations between them.' Explain. (12 marks)

6. Describe the developmental stages in a frog and a butterfly. What biological peculiarities do you notice? (9 marks)

7. What are the main distinctive features of 'Fishes'? Classify 'Fishes' and state how they are economically important. (9 marks)

8. Explain the following with suitable illustrations :—
(*a*) Struggle for existence, (*b*) Reduction division, (*c*) Alternation of generations, (*d*) Metameric segmentation, (*e*) Asexual reproduction, and (*f*) Protective colouration. (9 marks)

SECOND EXAMINATION

AGRICULTURE: PLANT HUSBANDRY—I

Three hours] [100 Marks.

Answer six *questions only* Questions 1 and 6 are compulsory.

1. What principles should a good farmer observe in manuring his lands? (18 marks)

2. Describe the method of preparing compost from organic waste material and explain the action involved in the process. (16 marks)

3. What is the difference between soil improvement and soil reclamation? (16 marks)

4. 'The fertility of a soil can be improved or maintained by proper rotation, fallowing and raising mixed crops.' Explain. (16 marks)

5. Cropping trials should be done before irrigation works are undertaken in a tract. Why? (16 marks)

6. What advice would you give a farmer who purchases improved strains of paddy seed from the Agricultural Department regarding the preparation of nursery and maintenance of purity of seed? (18 marks)

7. Give the normal acre yield of paddy in your district in the local measure and compare it with the yield obtained in the Central Farm. How many Madras measures of rice can be got from a Salagai of paddy and what will be the weight of rice in pounds? (16 marks)

8. What are plantation crops? Describe in detail the preparation of the marketable produce in the case of any two of them. (16 marks)

3 hours] AGRICULTURE: PLANT HUSBANDRY—II [100 marks.

Answer six *questions only.* Questions 1 and 4 are compulsory.

1. What is the difference between Productive Irrigation Works and Protective Irrigation works? Under what class does the proposed Tungabhadra Project come? Give reasons. How will this project help in the intensification of existing cultivation? (18 marks)

2. What is Sewage? How does it differ from sullage and effluent? Describe the various methods by which Municipal rubbish and night soil could be converted into Poudrette. (16 marks)

3. What are the causes of Soil Erosion on the Nilgiris? Enumerate all the methods that could be adopted to control and prevent the same. (16 marks)

4. The Cotton Specialist has evolved a new strain of Cambodia cotton which is superior to Co. 2 in every way. Cambodia cotton is grown in Coimbatore District over two lakhs of acres under irrigated conditions. Draw up a detailed scheme to multiply the seed of the improved strain of cotton so that it replaces Co. 2 completely in five years. (18 marks)

5. Cambodia cotton, cholam, ragi and tobacco are grown under a well in the course of two years. State what rotation will be followed and describe briefly the time of sowing, duration, time of harvest, yield, quantity and time of application of manures, if any, for the crops. (16 marks)

6. Under what conditions and in what parts of the Presidency do you find (*a*) Artesian wells, (*b*) Spring wells, and (*c*) Percolation wells? How is the water table affected in each of the three class of wells in different seasons? What are the crops that could be grown in summer season under each class of well with the mininum expense on irrigation? (16 marks)

7. Describe briefly how you would lay out a 10 acre plot of red loamy soil to raise Oranges, Mangoes, Sapotas, and Guavas. How many plants of each kind of fruit tree would you plant and what should be the spacing? Would you plant seedlings, or grafts, or budded plants? Give reasons for your choice and state when the plants would come to full bearing and give maximum yield. (16 marks)

8. What are the improvements effected in the Dry Farming Station, Hagari, for the benefit of the ryots of Bellary District with regard to (*a*) crops, (*b*) methods of conserving soil moisture, and (*c*) prevention of soil erosion? (16marks)

3 hours.] AGRICULTURAL ENGINEERING [60 marks.

Answer six *questions only.* Questions 1 and 5 are compulsory.

1. *a*) A well grown crop of cholam is standing on a field in the shape of a quadrilateral. You are asked to find out its acreage by surveying it with only a chain. Describe both field and office work involved.

b) Find out the area correct to a cent of a field bounded by the three straight lines AB, BC and CA given the following data:—

AB measures 610 links and bears 61° and the observed bearings of BC and CA are 300° and 201° respectively. (12 marks)

2. A contractor has agreed to do at Rs. 12 per unit earthwork in excavation for a well. The bottom measurements are 30 feet long and 20 feet broad. The depth is 20 feet and the side slopes are 1 : 1. He submits his bill by the mean measurements. Calculate the difference between this and the correct charge. (9 marks)

3. Three units of concrete broken stone in cement mortar in the proportion of 1:3:6 are to be laid for the 3 feet deep foundation of a stationary engine. Work out the quantities of the several materials required and describe the operations involved. Detail the tests which the cement should have been subjected to, before being passed for the work. (9 marks.)

4. A tank has a catchment area of 4 square miles. If the maximum recorded rainfall is 6 inches in 24 hours and if only 60% of this reaches the tank, what length of surplus weir would you provide allowing a margin of 18 inches between F. T. L. and M. W. L.? (9 marks)

5. *a*) Explain the terms (i) Hydraulic mean radius, (ii) Resistance Head, (iii) Pump efficiency, and (iv) Engine efficiency.

b) For supplying water to an Agricultural Colony whose requirements are 9,000 gallons per hour, it has to be pumped through 1,500 feet of 4 inch pipe by a centrifugal pump worked by a crude oil engine. If the static head is 70 feet and the efficiency of the pump 60%, calculate the horse power that must be applied to the pump shaft.

If the low water level is 50 feet deep, sketch a suitable location of pump and engine. The depth is measured from the ground surface of the supply well. (12 marks)

6. Discuss, in short notes, with illustrative sketches, how the following sources of power have been pressed into service at the Central Farm and the Agricultural College Estate at Coimbatore:—

Wind, Oil, Steam and Electricity. (9 marks)

7. Discuss factors operating against direct drives in the case of Farm Engines and Machines and indicate solutions. What should be the diameter of a cold rolled steel shaft to transmit 20 horse power through a 3 feet diameter pulley keyed on to it? What size pulley would you fit on the engine shaft whose standard normal speed is 300 R. P. M.? (9 marks)

8. Sketch in outline a modern Threshing machine naming the various parts and indicating their functions and adjustments for dealing with different grains. (9 marks)

3 hours.] AGRICULTURAL ZOOLOGY [60 marks.

Answer six *questions only*. Questions 2 and 7 are compulsory.

1. Describe clearly with the help of diagrams the organs collectively known as 'the mouth parts' in insects, pointing out the different types of this mechanism found among them. Explain how a knowledge of the mouth parts of any insect is helpful to the farmer. (9 marks)

2. Explain what you understand by 'A Crop Pest Calendar'; discuss its uses, if any. Prepare such a calendar for the Coimbatore area in relation to the important pests of that tract. (12 marks)

3. Name the insect or insects associated with the following plant diseases and give a brief account of each of them with the control measures possible against each:—

(*a*) Leaf curl of chillies, (*b*) Honey dew disease in mango. (*c*) *Surul* of groundnut, (*d*) Silver shoots of paddy, (*e*) Sugarcane leaf blight, (*f*) Cotton stem galls. (9 marks)

4. Give two examples of economic insects from each of the following groups, explaining the nature of the economic importance in each case;

Limacodidae, Capsidae, Coccidae, Cerambycidae, Sphingidae, and Thysanoptera. (9 marks)

5. Give a brief account of the important insect pests of stored agricultural products found in South India and state what control measures you would suggest. (9 marks)

6. 'The study of the relations between insects and climate is of very great importance in agriculture.' Discuss this remark with special reference to South India. (9 marks)

7. Write short notes on:—

(*a*) Hairy caterpillars, (*b*) Ericulture, (*c*) Borers, (*d*) Contact insecticides, (*e*) Insect phototropism, (*f*) Entomophagous insects. (12 marks)

8. Write a very brief summary, not exceeding three pages, on what is known as the 'Balance of life nature' with special reference to insects, explaining the important factors influencing this balance. (9 marks)

Three hours.] ANIMAL HYGIENE [60 marks.

Answer six *questions only*. Questions 3 and 5 are compulsory.

1. Enumerate the bones that constitute the cranium in the ox and describe briefly the one that is most extensive among them. (9 marks)

2. Describe the kidney of the ox and compare it with that of the sheep. Give the composition of their urine. (9 marks)

3. Explain with the aid of diagrams how the uterus of an ewe differs from that of a cow. Mention the period of gestation in these two species. What are the signs of oestrum in the cow and how long does it last? (12 marks)

4. State the uses and doses of the following drugs for a bullock:—(*a*) Chiratta, (*b*) Ammonium carbonate, (*c*) turpentine. Make out a prescription for a cough electuary to be given to a calf six months old. (9 marks)

5. Write an account of black-quarter with special reference to its etiology, mode of infection, symptoms and immunology. Give its differential diagnosis. (12 marks)

6. Name the common diseased conditions met with in the udder of the cow. Narrate briefly the cause, treatment and prognosis of any two of them. (9 marks)

7. Write short notes on the symptoms, treatment and prophylaxis of the following ;—

(*a*) ringworm, (*b*) liver-rot, (*c*) fowl cholera. (9 marks)

8. Discuss the general principles of feeding and nursing of sick animals. (9 marks)

FINAL EXAMINATION

AGRICULTURE—ECONOMICS AND FARM MANAGEMENT

Three hours] [100 marks.

Answer six *questions only.* Questions 2 and 8 are compulsory.

1. Write short notes on:—(*a*) Mixture crops, (*b*) Mixed cropping, and (*c*) Mixed farming. Mention the advantages and conditions necessary for their success. (16 marks)

2. After finishing your agricultural training you are provided with a capital of Rs. 25,000 and asked to live by farming. Where would you locate your farm, what kind of farming would you undertake and how would the capital be utilised for the purpose ? (18 marks)

3. Prepare farm accounts for the cultivation of the following crops, each grown on an acre:—(*a*) Wetland Paddy, and (*b*) Garden land Cambodia Cotton. (16 marks)

4. At the Pollachi market groundnut kernel sells at Rs. 25 per candy of 500 lb., jaggery at Rs. 10 per pothi of 250 lb., Cambodia cotton lint at Rs. 250 per candy of 750 lb. Taking into consideration normal yields and costs of cultivation of these crops in the Coimbatore district, work out profit and loss statements. (16 marks)

5. Discuss the different factors on which the value of agricultural land depends. (16 marks)

6. In recent years, the area under groundnut in the Madras Presidency is on the increase and the area under food crops is on the decrease. The population of the presidency is on the increase. Do you approve such a state of crop production ? How is the shortage in food grains to be met for the growing population ? (16 marks)

7. The pressure of population on land in certain districts is more than on others in this Presidency. What will be the effect of thick population on (*a*) the agriculture of the district, (*b*) the labour available in the district, and (*c*) the price of land ? (16 marks)

8. Write a short note on the laying out of plots for field experiments. (18 marks)

3 hours] AGRICULTURE—ANIMAL HUSBANDRY [100 marks.

Answer six *questions only.* Questions 1 and 4 are compulsory.

1. A ryot purchases a Kangayam Bull Calf, one and a half years old, from a leading stock-breeder, for using it as a stud bull. He proposes to recover the cost of maintenance of the bull within five years by levy of service fees. Estimate in detail the cost of maintenance and the service fees which he would be able to realise in order to recover his expenses in five years. (18 marks)

2. (*a*) How would you allocate the marks in a score card for a good Dairy cow ?

(*b*) Which breed of cow would you recommend to a ryot who wishes to start a Dairy on a large scale ? Give reasons for your choice. (16 marks)

3. Dearth of fodder in summer season is a problem in Coimbatore district. Suggest ways and means of solving it with reference to (*a*) local farming practices, (*b*) forestry, and (*c*) livestock. (16 marks)

4. The Perundurai Sanatorium requires 2,000 lb. of hygienic milk and 150 lb. of butter per day. A Producers' Milk Supply Union undertakes to supply pasteurised milk and butter, salted and untouched by hand. Describe in detail the equipment required in the Dairy Room and assess the capital outlay involved. (18 marks)

5. (*a*) Describe in detail the points you would look for in selecting a fast moving draught bullock.

(*b*) What breed of animal would you select for heavy draught work in the Ceded Districts ? Give reasons. (16 marks)

6. Which is the economic dual purpose breed of fowls you would recommend for Poultry farming ? Work out the economics of maintaining for one year 50 hens and the requisite number of cocks. (16 marks)

7. It is proposed to grade up the local sheep near Podanur, so that they could get uniform and better quality of wool for the local carpet industry and good mutton for Podanur and Coimbatore markets. What breed of stud Ram would you introduce in order to achieve their object ? What is the procedure you will adopt and how long will it take for complete success ? (16 marks)

8. Write short notes on ,—

(*a*) Nicking, (*b*) Atavism, (*c*) Capon, (*d*) Livestock Insurance, (*e*) Automatic Egg grader, (*f*) Escutcheon, (*g*) Kikyu grass, (*h*) Wyandotte. (16 marks)

Three hours.] AGRICULTURAL BOTANY—I [100 marks.

Answer six *questions only.* Questions 1 and 7 are compulsory.

Diagrams and illustrations should be given wherever necessary.

1. Enumerate the oil yielding crops raised in Madras Province mentioning their botanical names, families, varieties, distribution in the Province, economic importance, morphology of the oil-yielding portion and the usual methods of extraction. (18 marks)

2. What is 'seed testing'? Discuss its importance as a practice in scientific agriculture. Given samples of paddy, cotton and groundnuts, explain the nature of the tests you would conduct in assessing the samples. (16 marks)

3 Classify the cottons grown in South India and describe the morphological characters by which you would distinguish the species and varieties. (16 marks)

4. Mention examples of two indigenous and two introduced forage grasses which flourish in this Province. Describe their methods of propagation. Give a botanical description of any one of them. (16 marks)

5. Give a complete botanical description of the banana plant. Give a brief account of its geographical distribution in the world. (16 marks)

6. Describe the procedure you would adopt for the vegetative propagation of the following fruit crops:—

(*a*) orange, (*b*) mango, (*c*) apple. (16 marks)

7. Given your requirements in land, labour, manure and irrigation facilities, mention the horticultural operations necessary to successfully raise either (*a*) 50 cents of tomatoes in Coimbatore taluk, or (*b*) 25 cents of grape vines in Nilakkottai taluk (Madura District). (18 marks)

8. Enumerate the vegetable crops raised in Coimbatore taluk. Mention their scientific names, the natural orders to which they belong and draw floral diagrams for one species in each order. (16 marks)

3 hours.] AGRICULTURAL BOTANY—II. [100 marks.

Answer six *questions only.* Questions 2 and 7 are compulsory.

Illustrate your answers with suitable diagrams.

1. Explain clearly the 'Theory of mutation' and point out its practical bearing on the improvement of crops. (16 marks)

2. How would you utilise the principles of Mendelism in the improvement of the following crops?—

(*a*) Groundnut, (*b*) Cumbu. (18 marks)

3. Give a short account of the 'Reduction division of nucleus and its bearing on 'heredity'. (16 marks)

4. Describe the reproductive processes in ferns and compare them with the reproductive processes in Angiosperms. (16 marks)

5. Give an account of the preparation of a Pure culture of any fungus to inoculate a healthy plant. (16 marks)

6. Give a short account of the 'Evolution of Sex' in Fungi. (16 marks)

7. Describe in detail the life-history of 'Ring-disease' of Potato giving the characteristic symptoms and the measures taken to keep the disease under control. (18 marks)

8. Give a short account of the life-history of the Phytophthora causing the 'Bud-rot of Palmyra'. What are the measures adopted to combat this disease? (16 marks)

3 hours.] AGRICULTURAL CHEMISTRY—I [100 marks.

Answer six *questions only.* Questions 1 and 6 are compulsory.

1. What are the distinguishing characteristics of red, laterite, black-cotton, alluvial and peaty soils so far as their physical and chemical constituents are concerned? How do they differ from each other in their water-holding capacity and retention of manures and what are the reasons for such differences? (18 marks)

2. Write short notes on the work of the following in the development of agricultural science:—

Justus von Liebig, Lawes and Gilbert, Hellriegel and Wilfarth, Thompson and Way. (16 marks)

3. Describe one good modern method of conducting mechanical analysis of soils on a mass scale. How would you interpret the results obtained? (16 marks)

4. Describe a suitable chemical method, other than Dyer's, to determine ingredients that would give an idea of the fertility of soils. (16 marks)

5. Explain how the following manures become available to plants when they are added to soils:—

a nitrate, sulphate of ammonia, groundnut cake, superphosphate, bonemeal, and sulphate of potash. (16 marks)

6. Discuss the general functions of nitrogenous, phosphatic, and potash manures when applied to ordinary field crops. Specify any such manures which should not be used for certain crops like tobacco and potato with reasons therefor. (18 marks.)

7 Discuss the merits of cane juice needed for making sugar as well as jaggery, and describe one good method of producing white sugar direct from cane. (16 marks)

8. Discuss the various methods that are being proposed for the disposal of the huge amount of molasses produced in this country at present. Which is, in your opinion, the most feasible and profitable method and why? (16 marks)

3 hours] AGRICULTURAL CHEMISTRY—II [100 marks.

Answer six *questions only.* Questions 1 and 5 are compulsory.

1. (*a*) What are the two main groups of feeding stuffs? State how each group is of importance in the nutrition of cattle. What are the commonly available feeding stuffs of each group in this Presidency?

(*b*) Two samples of groundnut cake *A* and *B* are available on the market, their composition is given in the table below. Sample *A* sells at Rs. 35 per ton. Sample *B* at Rs. 31 per ton, which would you choose for your cattle and why?

		Sample A	Sample B
Moisture	...	10·10%	7·30%
Protein	...	42·90%	50·30%
Fat	...	6·60%	8·60%
Fibre	...	10·70%	8·60%
Carbohydrate	...	29·70%	25·20%
Acid value	...	21·0	171·0

(8 marks)

2. Why is a sliding scale of rations fed to milch cows in the College Dairy? State approximately the standards for cows of different grades. What is the principle underlying the adoption of the sliding scale? (16 marks)

3. Describe with experimental details how the Ether Extract of a feeding stuff is estimated. What is the significance of the Ether Extract in animal nutrition? (16 marks)

4. Write short notes on :—

(*a*) Pastures in relation to cattle disease, (*b*) Starch equivalent. (*c*) Effect of manuring on crop quality, (*d*) Plants as a source of vitamins, (*e*) Uptake of mineral matter by plants, and (*f*) Respiratory quotient. (16 marks)

5. What do you understand by the fixation of atmospheric nitrogen by leguminous plants? Give a brief description of the process and its importance in agricultural economy. (18 marks)

6. State briefly what you know about the carbohydrate metabolism of plants. Name two crops in which the final product of metabolism is of world-wide economic importance. (16 marks)

7. What is the average composition of cow's milk? How best should it be processed for marketing at some distance from the source of supply? What are the factors that make for spoilage in milk? (16 marks)

8. Why is milk considered to be an ideal food? How is its value affected by external conditions to reduce its quality as an ideal food? How would you prevent such a reduction in quality? (16 marks)

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EDITORIAL

The New Year. The year 1941 has dawned none too bright on an unhappy world. Three out of five continets are witnessing the ravages of a devastating war. Destruction of life and property continues unabated. Agriculture and trade are in the throes of a depression. Science and Industry, save those that are of direct consequence to the prosecution of the war, are waning ruinously. Restricted food distribution has created slumps in producing centres and distress in consuming areas. Despite these maladjustments inevitable in a period of crisis, the outlook for 1941 is brighter and more cheery than what it was in 1940. The *Madras Agricultural Journal* enters on its twentyninth year in an atmosphere of hope and faith. Increases in the cost of production and distribution of the *Journal* have been counterbalanced by increased patronage from our *clientele*. We thank our members, subscribers, contributors, advertisers and readers for their continued support and wish them all a happy and prosperous New Year.

Groundnut Trade. We had occasion to advert in a previous issue of this Journal to the sad plight of the groundnut growers in our Province and the groundnut trade as affecting India. As a result of the active interest taken by the Hon. Sir A. Ramaswami Mudaliar, the Commerce Member, the Government of India in consultation with the Food Ministry in England fixed the minimum price of groundnuts at £ 10 per ton f. o. b. Indian ports which works at Rs. 27—8 - 0 per candy of 531 lb. This has however not so far benefitted the growers as reports received from different parts indicate the existence of a great disparity in the prices now prevailing in the Indian markets and the minimum price offered by the Food Ministry. Thus the distress of the agriculturist and the small producer is profound and remains unsolved. It is now learnt that an arrangement has been reached between the Food Ministry in London and the Government of India for creating a fund for the benefit of the agriculturists from the proceeds of a rebate of 25 shillings per ton from South Indian shipments. This fund is proposed to be distributed to the growers on an acreage basis. We daresay that some such action to relieve the distress of the groundnut growers is urgently necessary to ease the feeling of despondency prevailing in the villages. We are encouraged by the recent press reports that the Government of Madras and some other Provincial and State Governments have agreed to foster the manufacture of products such as vegetable ghee, varnishes, lubricants and soaps from ground-nut oil. It is also understood that the Government of India are in correspondence with the Provincial

Governments in this connection. It is well known that groundnuts cannot be stored long without deterioration and it would greatly benefit our growers if this scheme is put on hand expeditiously.

We would urge that the question of utilizing groundnuts in India itself is tackled on another front also. That the groundnut is a cheap source of protein and a valuable article of food is beyond doubt. How far and in what manner it can be included usefully in South Indian diets needs a careful study at the hands of our nutrition experts. Such an investigation coupled with effective propaganda will no doubt stimulate the consumption of groundnuts within our own country. Further the increased crushing of groundnuts would release large quantities of groundnut cake which is a very rich source of proteins for our cattle, besides its being a valuable manure particularly for sugarcane and paddy crops. The price of nitrogenous fertilizers has shot up prohibitively since the outbreak of the war and imports have dwindled. Oil cakes could well replace them now at a much cheaper rate.

We are glad that the recent conference of representatives of groundnut interests at Madras has focussed the attention of all concerned to the pitiable plight of our ryots and we hope that their sustained efforts would ere long afford the agriculturists the much needed relief.

An Agricultural Pests and Diseases Act for Bombay. The decision of the Bombay Government to enact a legislation on the lines of the Madras Agricultural Pests and Diseases Act of 1919 is a move which has not emanated too soon. Adequate control of insect pests and diseases is a matter of vital importance to the cultivator in India as elsewhere. In the matter of pests and diseases, the policy of Agricultural departments in India has been to bring to the door of the peasant cultivator the necessary knowledge about methods of control. With many pests and diseases this is all what is needed, since the adoption of the measures gives the cultivator relief, while failure to follow up demonstrable remedies does harm only to himself. But there is another important category of pests and diseases where the range of spread is not confined to the limited area of an individual holding. In such cases, the negligence on the part of the few would not only do harm to themselves but would render the efforts of their neighbours futile. The negligent and the unbelieving would thus become a danger to society so that the protection of the crops belonging to the many by compelling the few to fall in line with the rest, becomes a paramount duty of the state. The enactment of a piece of legislation making it incumbent on all cultivators in a specified tract to adopt a uniform procedure, is the only means of mitigating this evil. Failure to carry out the measures would authorise a state agency to enter the holding, carry out the operations and recover the cost from the delinquent. Wilful infringements of the regulations would also render him liable for prosecution. Legislation on these lines has worked successfully in Madras and her neighbouring states for well over two decades and we trust that Bombay will be no exception in deriving benefit from the contemplated enactment.

Studies in the Barnyard Millet—*Echinochloa colona* var. *frumentacea*, C. E. C. Fischer.

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The Barnyard millet, known in Tamil as *Kuthiraivali* (=horse-tail), is one of the less important millets of the Madras Presidency. Except in certain restricted tracts its importance as a food crop in India is not much. In view of the fact that it forms a good famine crop and also comes to the rescue of very poor cultivators, some of its characters were studied at the Millets Breeding Station and are presented below:—

This plant is considered to have been first brought into cultivation in India. That it has been grown all over India since very remote times is seen by the fact that it has a name in Sanskrit, as well as in every one of the other Indian languages.

Werth (1937) mentions this plant occurring as a weed of cultivation in the temperate and tropical zones of both hemispheres, particularly the Northern and that it is cultivated as a millet (as a poor man's millet) in India, China, Japan, Dutch India and in smaller quantities in Africa. In China and Japan particularly it is said to be used as a substitute crop when paddy fails.

Its composition is given by Church (1886) as follows:—

		In 100 parts.
Water	...	12·0
Albuminoids	...	8·4
Starch	...	72·5
Oil	...	3·0
Fibre	...	2·2
Ash	...	1·9

The nutrient ratio here is 1 : 9·5 and the nutrient value is 88.

This millet is used in India either boiled in water like rice, or parched or boiled with milk and sugar.

As a fodder it seems to have attracted greater attention especially in the U. S. A. Bressman and Fry (1932) consider this plant as the best late season feed, taking the place of maize in certain parts, which are unsuitable for maize. Thatcher (1900) gives the following composition of this plant as a forage crop.

Composition of feeding stuff at different stages of growth.

Feeding stuffs	Water	Protein	Albuminoids	Ether extracts	Nitrogen free extracts	Crude fibre	Ash
Millet: Heads just appearing	10·24	8·41	5·79	2·54	32 03	35·86	10·92
Headed out seeds near ripe.	10·47	6·12	4·49	1·52	43·33	29·10	9·41

He concludes that here the protein decreases rapidly while heading out and to obtain a fodder having as narrow a ratio of flesh-forming to fat-forming foods as possible the crop should be cut at as early a stage as it can be well cured. As a roughage it can be allowed to grow till seeds are formed.

Lindsey (1900) gives the following coefficients of digestibility of this plant: green, as hay and as silage with soybean, obtained with sheep.

Coefficients of digestibility of millet, millet hay etc.

	Dry matter	Protein	Fat	Nirogen free extracts	Crude fibre	Ash.
	%	%	%	%	%	%
Green millet, early to late bloom	71	69	63	72	73	64
Millet hay, full bloom	56·5	47·5	48	53.5	62	43·5
Millet and Soy bean silage	59	57	72	59	69	—
Corn and soy bean silage	69	65	82	75	65	—

He points out that when harvested early, in blossom, the fodder contains less nitrogen-free extract matter, more fibre or woody matter and rather more ash than corn fodder and so it must be cut when in blossom, to secure it in the most desirable condition for feeding.

On well-manured soils it gave 11,297 lbs. of straw and 66·7 bu. per acre and 12—15 tons per acre of green forage. Wood (1928) gives the yield of straw as 2,000 lbs. per acre, Mukerji (1915) records 800 lbs. and Mollison (1901) 1,500 lb. Watt (1889) states that the straw is used much in the Madras Presidency and Mysore as cattle fodder, though considered inferior to ragi as well as to paddy straw.

Kuthiravali is sown mostly as a rainfed crop. In the drier districts, it is grown as a subordinate crop to sorghum (Duthie and Fuller 1882) or maize (Watt l. c.) The plant can be grown either on light sandy soils (Duthie and Fuller. l. c.; Mollison. l. c.) with fair rainfall or in water-logged areas (Wood. l. c ; Watt. l. c.), such as lowlands or banks of rivers that often get submerged. Mukerji (l. c) reports that rough jungle land could be used. It withstands transplanting (Mollion l. c.) The crop requires little or no manuring.

The seed rate is generally 8—10 lbs. per acre and when sown with a drill about 6—8 lbs. per acre. Wood (l. c.) quotes 35 lbs. per acre. The July sown crop is harvested in October

In Punjab this plant is said to be ploughed into the soil as a green manure.

Systematics. Hooker (1897) brings this plant under the sub-section Echinochloa of the genus Panicum. He recognises two very closely allied species viz. *Panicum crusgalli*, Linn. and *Panicum colonum*, Linn. The cultivated species is regarded as a variety of *P. crusgalli*. In his species of *P. crusgalli*, Linn. he finds innumerable forms so that it became "impossible to find characters constant enough for their limitation". He finds that *P. colonum* Linn. exhibits a gradual transition into *P. crusgalli* and *vice versa*. The cultivated variety *furmentaceum* has been assigned to both. Cosson and Thwaites are reported having regarded *colonum* as a form of *crusgalli*.

Cook (1908) mentions that the *Panicum crusgalli* of Linnaeus does not occur in the Bombay Presidency. He considers the cultivated form as a variety of P. *stagnium*, Retz.—P. *stagnium*, Retz., var. *frumentacea*, Trinn. The species *crusgalli* has no ligule. P. *frumentaceum*, Roxb. and *Oplismenus frumentaceus* Dalz. and Gibs. are given as synonyms of P. *stagninum* var. *frumentacea*. He remarks that P. *colonum* is very similar to var. *frumentaceum*, Roxb. but a more slender plant with smaller spikelets.

Chevalier (1922) quotes the following synonyms for this plant: P. *frumentaceum* Roseb., P. *grossum*, L. P. *segetale*, Roxb., *Echinochloa frumentacea*, Link., *Oplismenus frumentaceus*, Kunth. P. *frumentaceum* is said to be a variety of P. *crusgalli*, L. It is considered by most authors that P. *frumentaceum* possesses characters intermediate between those of P. *crusgalli*, L. and P. *colonum*, L.

Bressman and Fry (1932) distinguish the weed *crusgalli* from the cultivated millet by its greater hairiness of the glumes, and the longish seeds. The millet is less hairy and has broader seeds.

Fischer in Gamble (1934) removes the group from *Panicum* and gives the plants a separate generic stand, viz., *Echionochloa*. Under this genus he ennumerates 3 species:—

1. *Echinochloa colona*, Link. = *P. colonum*, L.
2. *Echinochloa crusgalli*, Beauv. = *P. crusgalli*, L.
3. *Echinochloa stagnina*, Beauv. = *P. crusgalli*, L.

The cultivated species is treated as a variety of *colonum* viz. *E. colona* var. *frumentacea*, C. E. C. Fischer=P. *crusgalli*, Linn.var. *frumentaceum*, Hook.

The following is the description of the species as given by Gamble:—

Echinochloa, Beauv. Annual or perennial, often tall herbs. Leaves narrow. Inflorescence of crowded panicles of loosely arranged, secund, spiciform branches bearing spikelets from the base or near it; rachis triquetrous. Spikelets ovate

to elliptic or lanceolate—oblong, 2-nate or clustered, articulated on and falling entire from the pedicels.

Glumes membranous, unequal; the lower much the shorter, mucronate, cuspidate or awned, the upper coincident in outline with the spikelet, acute, cuspidate or shortly awned. Lemmas: Dissimilar; the lower equalling the upper glume (excluding cusp or awn) its palea 2-keeled, empty or containing a male floret; the upper subcoriaceous or crustaceous, ovate, to elliptic-oblong, obtuse or apiculate, polished, very convex on the back, its pales as long, with rounded sides and flaps, containing a bi-sexual floret. Lodicules 2. Stamens 3. Styles free. Grain broadly elliptic, plano-convex.

Racemes simple, rather distant ·3 – 1·25 in. long; lower glumes and upper glumes about equal, obtuse or cuspidate. Annual, up to 2 ft. high; leaves 2-8 in long, ·1 – ·45 in. wide, ligule 0; spikelets ovoid ·1 – ·12 in. long; lower glume ·04 – 05 in. long; upper ·09 – ·11 in. long; lemmas ·08 – ·1 in. long lower with male floret..... *colona.*

Racemes usually more or less branched ·8 – 2 in. long; lower glume and upper lemma cuspidate or awned, the latter the longer; lower lemma often awned:

Annual, up to 3 ft. high leaves 3 – 21 in. long; ·2 – ·5 in. wide, ligule 0, junction of blade and sheath glabrous, usually marked by a brown zone; spikelets ·15 – ·18 in. long; lower glume ·07 – ·12 in. long, upper ·15 – ·17 in. long; lower lemma empty, ·14—·17 in. long, upper ·12 – ·15 in. long; awn of lower lemma up to 2 in. long..... *crusgalli.*

Usually perennial, up to 6 ft. high; culms rooting and often branching from submerged nodes; leaves 3 – 18 in. long, ·2 – ·4 in. wide, ligule a fringe of stiff hairs, sometimes absent on the uppermost leaf; lower lemma empty or with a male floret. Otherwise as in the last species..... *stagnina.*

Echinochloa colona (link.) var. *frumentacea*, C. E. C. Fischer: a taller and more robust plant with dense, sometimes corymbose panicle, cultivated.

Observations on flower pollination. Hildebrand (in Knuth 1909) reports that only self-pollination is possible in this species, owing to the simultaneous protrusion of stigma and anthers, but crossing may be effected when the anthers have fallen, as the stigmas are persistant.

Youngman and Roy (1923) found the flowers opening between 7-30 and 8-30 a. m. They observed that the stigmas and anthers emerge simultaneously. The stigmas spread out immediately on emerging, while the anthers dehisce only after about 1—1½ minutes. The glumes are observed to close back after half an hour.

Observations made at the Millets Breeding Station, Coimbatore on two types of panicle shapes, viz, open and compact, gave the following results The plants were grown under irrigated conditions. The observations were done on three plants in each type. The plants commenced to flower in about two months after sowing. The tip of the leaf subtending the panicle (flag leaf) appears first and takes about 10 to 14 days for the complete emergence of the flag. The appearance of the panicle is almost simultaneous with that of the flag, but its emergence is gradual, taking from 9 to 13 days.

The flowers begin to open in the same order as they emerge out of the sheath. The first flowers open as soon as the panicle tip emerges out. The order of flowering is thus from the tip of the panicle to the base. But in the

individual spikes the spikelets along the two margins open earlier than those at the middle. The flowering period is 19—22 days in the open panicles and 2 or 3 days more in the *compact* ones. The largest number of flowers open during the sixth to eighth day from the commencement of flowering. The opening of the individual flowers is between 5-10 a. m. The maximum number of flowers open between 6 and 7 a. m.

The glumes open out very gradually and at the mouth of the gaping glumes the two stigmas and the anthers stand out like a column. Two to four minutes later the stigmas emerge out of the lemma in a column and spread out on either side. The stamens thus come to occupy the central position. The filaments begin to elongate gradually in about 1 to 8 minutes after the spreading of the stigmas. The dehiscence occurs only when the filaments have elongated to their maximum. The dehiscence is by lateral sutures. It begins at both ends and meets in the centre. The glumes close again in about 5 to 10 minutes after the dehiscence. The stamens and stigma remain outside the closed glumes. The whole process, from the opening of the glumes to their complete closing, takes about 24 minutes.

Inheritance of characters.

I. *Anthocyanin pigmentation.* The only anthocyanin pigmentation met in this plant is purple. When the plants do not show any trace of the pigmentation they are designated as 'green through-out' (abb. GT.) The purple pigment normally manifests itself in the following regions of the plant:

(a) Vegetative parts—nodes, internodes, as two bands on the upper and lower sides of the nodes, leaf margins, midrib, sheath, panicle-rachis, glumes.

(b) Reproductive parts:— lemmas, anthers and stigma

Three grades of pigmentation designated P3, P2, P1, in descending order of their intensities, are met with. The anthers and stigmas show various colorations on drying corresponding to the grade of the plant-pigmentation. The following gives the chief differences between the various types:

Class of pigmentation.	Character and incidence of pigmentation				
	Vegetative Parts.	Reproductive parts			
		Anthers		Stigma	
		fresh	dry	fresh	dry
P.3	Deepest purple of all types	deep purple	deep blue	deep purple	black
P.2	Pigmentation less than in P_3	purple	a blue ring around the sutures	purple less than in P_3	dark brown
P.1	Pigmentation less than in P_2	yellowish brown	brown	light purple	brown
GT	No purple pigmentation, all green	yellow	brown	colourless	pale brown

A certain amount of fluctuation in the depth of pigmentation occurs in each of the three types. In the following segregations it was found that P.3 and P.2 groups were often rather difficult of separation and in certain cases the P.1 almost approached P.2.

(a) *Purple and green segregations:—*

Two kinds of segregations were met with, viz., a monofactorial and a bifactorial one.

The bifactorial segregations gave the following F_2 proportions.

Female parent = Green throughout
F_1 = P.2
F_2:—

	P.3	P.2	P.1	GT
Observed	266	80	88	44
Expected on 9:3:3:1	268·9	89·6	89·6	29·9

$X^2 = 7·73$ $P > ·05$

In the monofactorial segregations the following F_2 proportions were obtained :—

Female parent = green throughout.
F_1 = P. 1
F_2:—

	P. 2	P. 1	GT
Observed	29	71	33
Expected on 1:2:1	33·25	66·5	33·25

$X^2 = 0·84$ $P > 0·50$

The same proportions were met with in the further progeny of the hybrid. (Total of 9 families gave P. 2 = 330; P. 1 = 628; GT = 329. calculated P.2 = 321·75; P.1 = 643·5; GT = 321·75). This clearly indicates a 1:2:1 ratio. According to expectations all the P.1 selections proved to be heterozygous.

(b) In segregations between the three pigmentation groups, the 1:2:1 proportions were again met with :—

	P. 1	P. 2	P. 3
Total of 20 lots	751	1540	890

The P. 2 group is smaller and the P. 3 group larger than they should be for an exact 1:2:1 ratio, because their separation is not quite easy, the obvious P. 2 alone going into the middle group. Subsequent selections however showed that the P. 2 were all heterozygous and the P. 3 and P. 1 selections bred true.

It is evident from these that there are only two factors responsible for pigmentation in this plant. Further, it is evident that pigmentation differences between the heterozygotes and the pure ones are easier to be noted in the monofactorial segregations than in the two factor ones.

The factors may be designated as follows:—

$P_2P_2P_1P_1$	P. 3	$p_2p_2P_1P_1$	P. 1
$P_2P_2p_1p_1$	P. 2	$p_2p_2p_1p_1$	G. T

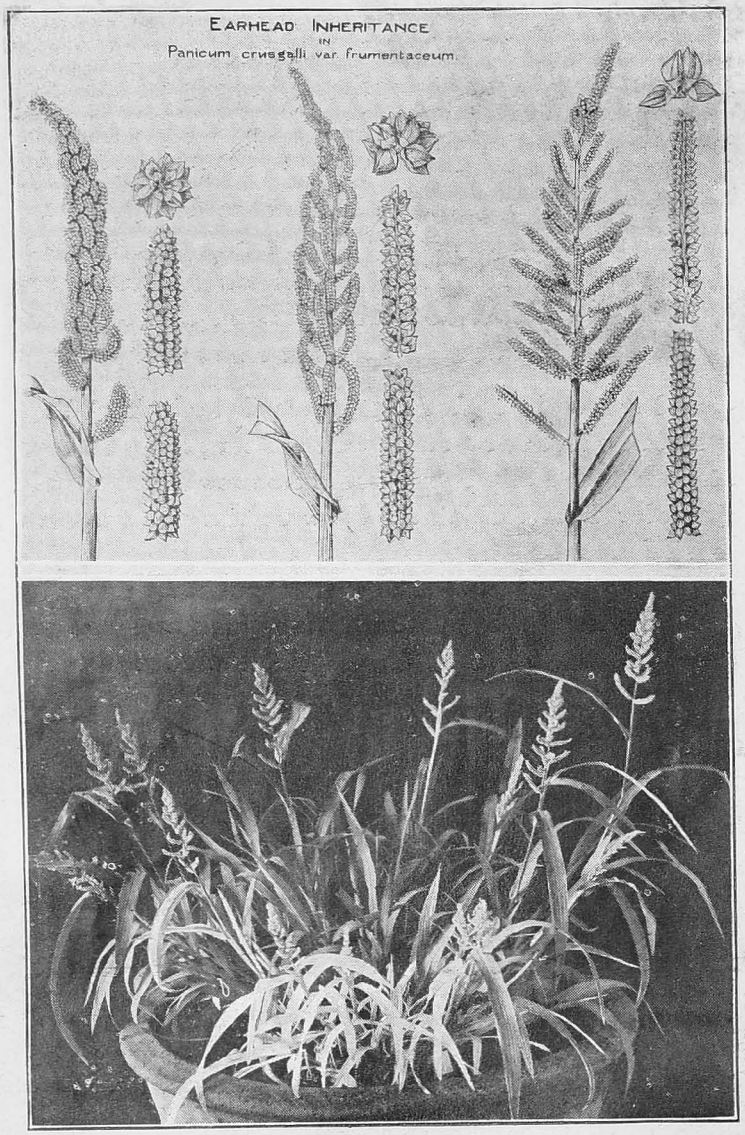

Fig. 1. (Top) Inheritance in ear-head shape. (Left) Compact head; (Right) Open head; (Middle) F_1; Single branches:— Top—cross section; Middle—rear and bottom—front view.

Fig. 2. (Bottom) Striped plant.

II. *The Panicle* (Plate I, Fig. 1). The panicle is conical in appearance. The number of panicles on a plant depends on its branching and tillering capacity. Each panicle is peduncled.

The peduncle is cylindrical and is continuous with the rachis, which however is angular. The spikes arise in whorls of 2 or more often 3—4, or sometimes 5. Each whorl thus constitutes more or less a node. The disposition of the whorls is more distant at the base and becomes less distinct and more congested towards the apex. The spikes arise on the face and not on the angle itself. They alternate in successive whorls so as to give a $\frac{1}{2}$ taxis. Thus the panicle shows a tetraquetrous arrangement. Consequent on the congestion towards the apex the whorls may become disturbed but still the tetraquetrous nature is kept up. The length of the spikes reduces gradually from the base towards the apex and the ultimate apex ends in a spike. This arrangement is responsible for the conical shape of the panicle.

The spikes are more or less ascending. The base of the rachis is somewhat pulvinate. The node at the base of the pulvinus is pubescent. Hairs, isolated or in tufts of 2—3 are found on the rachis, at the base of the spikelets. Groups of spikelets are arranged distichously along the dorsal side of the rachis. These groups consist of 3—4 spikelets distichously arranged on a short rachilla. The spikelets are all more or less equal in size. In general design they appear to be arranged in horizontal rows of 4 to 5 spikelets. The rachis attenuates towards the apex. The number of spikelet groups, however, remains the same and consequently the spikes tend to curve on their ventral side. This becomes more pronounced as the grains begin to mature. The spike ends may be seen almost spirally twisted and bent towards one side to avoid overlapping the upper one, so that the panicle gets a plaited appearance.

Two distinct types in head-shape could be distinguished, viz., Open and Compact.

In an open panicle the spikes are more or less horizontal and may or may not be curved towards the tip. The interval between the whorls is greater than in a compact panicle. The length of the spike is also greater and the spikelet groups are more spread out.

The compact panicle on the other hand shows the spikes much plaited. The spikes are much shorter and spikelets are very close together.

Further, the spikes in the 'opens' have a greater number of spikelet groups with usually 2—3, often 4, and rarely 5 spikelets per group. The 'compacts' on the other hand have usually only 3-4 spikelets per group, often 2 and very rarely 5.

An intermediate condition between the lax-ness of the 'opens' and the plaited appearance of the 'compacts' is met with. This is termed the 'semi-compact' head. In this the spikes do not completely overlap one another so that the main rachis becomes visible.

An analysis of typical heads gave the following results :--

Panicle type	Average number of spikelets	Average length of spike	Average number of spikelets per cm.
Open	26	2.8	9
Compact	22	1.9	12

Thus it becomes apparent that the headshapes are distinguished by the difference in the length of the spike and secondly the denseness of packing of the spikelets, i. e. the number of spikelets per cm. A similar experience is met with in the *E. coracana* also. (Ayyangar *et. al.* 1932).

III. *Sterility*. A case of male sterility was noted in a purple-pigmented plant. The emerging anthers instead of being purple were seen to be yellow and shrivelled up later without dehiscing. The anther sacs were devoid of free, healthy, pollen. This character was found to behave as a monogenic recessive to the normal condition.

IV. *Striped plant* (Plate I, Fig. 2). A single case of albino-striping was met with. This plant produced 31 tillers. The first was half albino and half green. The next six were all green and 4 white. Then again were formed seven green and the rest 10 white. Three tillers developing from the first were found to be green, though the parental one was half green and half albino. This is probably due to a chimaera, the mutation having taken place very early, probably even in the seed itself and affecting one half of the embryonal growing point, so that about half of the tillers is striped or white and the other half is green.

Seeds were collected from 27 tillers individually and progenies raised. The seed-setting in the heads from the green tillers was better (average 293 grains per head) than in those from the white ones (average 159 grains per head). The viability of the seeds was good (88% germination in seeds from green and 84% from those of white tillers). The progeny in either case (i. e., from the heads from green portion and that from white portion) gave green and pale seedlings. The proportions of green to pale seedlings were widely different:—

		Green	Pale	Ratio
i. Progeny from green tillers				
Total of 7 tillers	...	1074	350	3:1
,, 3 ,,	...	511	57	15:1 (approx)
,, 1 ,,	...	144	102	9:7
,, 3 ,,	...	254	327	7:9
ii. Progeny from white tillers				
Total of 4 tillers	...	414	168	3:1
,, 5 ,,	...	658	46	15:1
,, 1 ,,	...	58	50	9:7
,, 2 ,,	...	95	119	7:9
iii. Progeny from the half green and half white tiller	...	103	206	1:3 (approx)

On the total the progenies of this plant gave 3311 green seedlings and 1425 pale seedlings. Some of the pale seedlings that were allowed to

grow further put forth only green leaves. Neither the green nor the pale seedlings produced tillers with striping or albino.

Cytology:—Hector (1936) gives the following resume. "The chromosome number was first reported as ca. 48 (2n). According to Church (1929) the haploid number is 21. Avdulov (1931) found 54 (2n). Hunter (1934) 36. As the basic number of the Paniceae is 9, Avdulov's and Hunter's figures would appear to indicate polyploidy."

Echinochloa colona, Link. is a close relation of this plant which is cultivated as a millet in several parts of India and occurs wild all over the country.

E. colona appears to hybridize spontaneously with *E. colona*, var. *frumentacea*. The two plants can be distinguished easily by means of their panicle characters:

	E. colona	var. *frumentacea*
Rachis	Flat, triquetrous	Tetraquetrous
Arrangement of spikes	Bilateral, alternating	Whorled to spiral
Disposition of the spikes	Almost vertical and adpressed to rachis	Horizontal to ascending, divergent
Spikelets	Solitary or in twos, pedicelled	Always in groups of 3–5, sub-sessile.

The *colona* species itself sometimes shows a tendency to whorling. The weaker and later-formed panicles of *frumentacea* tend to be less whorled. The progenies of some natural hybrids gave in the F_2. a large number of intermediates with regard to the number of spikes and also the manner of arrangement.

Summary. *Echinochloa colona* var. *frumentacea*, originally classified under Paniceae (*Panicum crusgalli* var. *frumentaceum*), though one of the less important millets of India forms a good famine time fodder and grain plant.

It can be fed green or as hay, or as silage. The plant has the advantage that it can grow in poor soils, as also under water-logged conditions.

Three pigmentation types P. 3, P. 2, P. 1 and one non-pigmented type GT. have been described. These show a two factor difference.

The panicle-shapes are of three types—Open, semi-compact, and compact. These are considered to be due to differences in the length of spikes and density of the spikelets. The relationships of these three types are yet not fully clear.

A type of male-sterility, simple recessive to the normal condition has been described. Albino-striping was met with and its progeny has given seedlings with green and pale colours in various proportions.

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The Cultivation of Betel vine (*Piper betel*) in Poonamallee village

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Introduction. In view of their proximity to Madras City, where there is a great demand for the leaves, betel vine cultivation is very important in the villages of Poonamallee and Kunnathoor. The area under this crop at present is about 350 acres. The crop is cultivated entirely under well irrigation, except for a few months in the year (October to March) when water from the Chembarambakkam tank is utilised. Unlike other crops which are raised by the efforts of individual farmers, a plot of betel vine garden is managed by a group comprising 15 to 20 men, who pool their resources to meet the cultivation expenses and likewise share the profit. The land is generally taken on lease, and the lease amount ranges from Rs. 75 to Rs. 100 per acre About ten years ago, gardens when once started, used to flourish and yield well, even up to six years. Lately, the life of a garden has become shortened and now-a-days no garden thrives for more than three years. This is attributed to wilt disease, common in all the gardens in this tract. The gardens go by the name *Illangal thottam* in the first year, *Sambakkal thottam* in the second year, and *Muthukal thottam* in the third year. Each cultivator will have a share in each of the three stages of maturity, so that he may have a steady income

Varieties cultivated. The main variety cultivated is the *Ravesi* The leaves of this variety are of medium size, light green and not too pungent. The other varieties which are very sparingly cultivated in these parts are

Karpura and *Kammar*. The former resembles the *Ravesi* in shape, size and colour, but it is more pungent. The *Kammar* leaves are deeper green and broader than the other two varieties.

Planting season. There are two distinct seasons for starting a garden —January to February and June to July. Inspite of the advantages present in planting in June to July season, when owing to the receipt of North-east monsoon rains fewer irrigations will be required to rear the cuttings, the cultivators usually prefer the other season, because from experience, they have realised that the gardens started in January to February season yield better. This may be probably due to the dry weather that prevails during these months which facilitates quick establishment of the cuttings.

Calendar of operations.

Operations.	*Planting season.*	
	Jany. to Feby.	*June to July.*
Preparation of land (ploughing and trenching)	Jany.—Feby.	June—July.
Sowing *agathi (Sesbania grandiflora)* seeds in trenches.	Do.	Do.
Planting betel vine cuttings in trenches ...	April—May.	Septr.—October.
Initial trailing of the vines on the *agathi* 'standards'.	End of July.	End of December.
Tying bamboo or dried *agathi* poles horizontally, to the *agathi* 'standards' at a height of 6 to 7 ft. and forming arches.	September.	February.
First picking of leaves.	November.	April.

Details of cultivation. (i) *Preparatory cultivation.* Trenches, two feet broad and one and a half to two feet deep are dug along the length of the field, about four feet apart. Generally, no ploughing is done before the trenches are dug. Irrespective of the shape of the land, the total length of the trenches will be about 7,000 running feet per acre. Trench digging is usually done, on contract.

(ii) *Manuring.* The manures generally applied are cattle manure and horse dung. Sometimes, tannery refuse also is applied. Generally, no manuring is done at the time of preparing the land, but three months after planting the cuttings, farm-yard manure is applied at the rate of 25 to 30 cartloads per acre. From this time onwards manuring is done at the above dose, once in three or four months.

(iii) *Sowing the 'standard'.* On the ridges formed "*Agathi*" (*Sesbania grandiflora*) seeds mixed with "*Thagarai*" (another species of *Sesbania*) in the proportion of 4 : 1 are sown in lines. Generally four lines are sown with four to six seeds dropped in each hole, spaced six inches apart. Along with this, about 200 plantain suckers are also planted on the ridges. The plantain crop is raised primarily for its yield of fibre necessary for tying up the vines to the standards and for tying bundles of harvested leaves, but incidentally the crop yields a revenue from the bunches and

leaves which find a ready market. The *agathi* crop has to be irrigated from time to time and in about three months the standards will be about four to five feet high.

(iv) *Planting cuttings.* The next operation is the preparation of the flat surface of the ridges, to plant the vine cuttings. The surface is levelled and the edges are slightly raised to hold water. Cuttings with at least three nodes are planted in a slanting position, so that two of the three nodes are well covered by soil.

(v) *After cultivation.* These newly planted cuttings have to be irrigated (usually by splashing water stored in the trenches) four or five times a day during the first fortnight. During the third and the fourth weeks, watering is done twice a day and afterwards once a day. The cuttings strike root after about 30 to 40 days, and fresh shoots appear from about the 60th day onwards. About four or five months after the planting of cuttings, long bamboo poles (*agathi* stems from old gardens can be got at a cheaper rate) are tied horizontally to the *agathi* standards about six feet from the ground level. Out of the four rows of *agathi* standing on the ridges, two from one ridge and two from the next are bent and tied together just above the middle of the trench in the form of an arch. The growing shoots are generally trailed on the standards once in ten days or a fortnight. In about six months from the date of planting, the vines would have grown up to a height of about seven feet and the first picking of leaves can be done. If the vines are allowed to grow tall, gathering of leaves will become difficult. So, once in the first year and twice in the succeeding years, the vines that have grown above seven feet are brought down, the lower four feet coiled and covered up with earth. The distal ends of the shoots are trailed again on the 'standard'.

(vi) *Harvesting.* The first picking of the leaves can be done at the end of the sixth month after planting. In the first and second years the leaves are gathered once in a fortnight, while in the third year, the interval between two successive pickings is reduced to ten days and the quality of leaves obtained is slightly inferior. Usually the cultivators themselves and the members of their family attend to picking of leaves Occasionally, outside labour is engaged, and each labourer is paid at the rate of one to one and a half annas for a basket full of leaves (6,400) gathered. Apart from the betel leaves, the growers gather tender *agathi* shoots at intervals of about one month and sell them in the market. There is a great demand for it as 'greens' and for feeding milch cattle. From the plantain suckers, about 175 bunches are got by the end of the first year. After harvesting the bunches, the mother plants are cut off, leaving one side-sucker in each stool. Thus, every year, about 175 bunches of plantains are also obtained; besides these, plantain leaves are also cut and sold. In addition, vegetables like brinjals, chillies, etc., are also grown (as a catch crop) here and there in the gardens. They are mostly used for domestic consumption and rarely sold.

Cost of cultivation per acre.

Details.	1st year.			2nd year.			3rd year.		
(a) *Expenditure.*	Rs.	a.	p.	Rs.	a.	p.	Rs.	a.	p.
1. Digging trenches, 2 ft. broad and 1½ ft. to 2 ft deep, 4 ft. apart, @ 2¼ annas for 50 running feet of the trench.	20	0	0						
2. Marking lines on the ridges making holes 6" apart on the lines and sowing *agathi* seeds 12 men at 4 annas each.	3	0	0						
3. Cost of *agathi* and *thagarai* seeds (24 M. M. at Rs. 2—8—0 per M. M.*)	60	0	0						
4. Cost of 200 plantain suckers at 1 anna each.	12	8	0						
5. Cost of labour for planting the suckers 8 men at 4 annas each.	2	0	0						
6. Cost of watering *agathi* on alternate days from the time of sowing to the time of planting the betel vine cuttings (3 months) at Re. 1—4—0 per watering.	56	4	0						
7. Taking mud from the trenches, plastering the sides of the ridges and rectifying the ridges just at the time of planting the cuttings and subsequently once in a month (9 times in the first year and 12 times in the succeeding years) 30 men for each operation at 4 annas each. ...	67	8	0	90	0	0	90	0	0
8 Cost of betel vine cuttings 135 bundles of 220 cuttings each at 3 bundles for a *Varahan* (Rs. 3—8—0).	157	0	0						
9. Cost of labour for planting the cuttings 20 men at 4 annas each.	5	0	0						
10. Cost of irrigation during the first fortnight (splashing water 4 or 5 times daily) at Rs. 2 per day.	30	0	0						
11. Cost of irrigation during the second fortnight (splashing water twice a day) at Rs. 1—8—0 per day.	22	8	0						
12. Subsequent irrigations (splashing water from the trenches) once a day at Re. 1-4-0 per watering—about 240 irrigations in the first year and 300 irrigations in the succeeding years.	300	0	0	375	0	0	375	0	0
13. Cost of tying up the cuttings to the *agathi* stems once in a fortnight from the 6th month onwards (12 times in the first year and 24 times in the second and third year) 10 men at 4 annas each for each operation.	30	0	0	60	0	0	60	0	0
14. Cost of 3,500 bamboos for tying the *agathi* standards at Rs. 5 for 120 bamboos. ...	137	8	0						
15. Cost of ropes required for tying the above.	15	0	0						
16. Labour required for the above item, 40 men at 4 annas each.	10	0	0						
17. Cost of labour for picking leaves at 1¼ annas for basketful of leaves (6,400)—four pickings in the first year, 24 in the second and 36 in the third year. In the first and second years 100 baskets per picking and in the third year only 50 baskets per picking.	31	4	0	187	8	0	140	10	0

* M. M. = Madras Measure (roughly three pounds).

Details.	1st year.			2nd year.			3rd year.		
	Rs.	a.	p.	Rs.	a.	p.	Rs.	a.	p.
18. Cost of labour for gathering *agathi* leaves twice in the first year, 10 times in the second year and 6 times in the third year.	3	0	0	15	0	0	9	0	0
19. Manuring, twice in first year 4 times in the second and third years at 25 cartloads each time at Re. 1—8--0 per cartload. ...	75	0	0	150	0	0	150	0	0
20. Cost of labour for bringing down the grown up vines making coils of the lower portions, putting soil over them and trailing the young shoots to the standards—twice in the second year and twice in the third year, 80 men at 4 annas each for each operation.				40	0	0	40	0	0
21. Lease amount (Land).	100	0	0	100	0	0	100	0	0
22 Cost of levelling the fields and bringing to the original condition.							14	14	0
Total. ...	1.138	0	0	1 017	8	0	979	8	0
Grand Total. ...				Rs. 3135/-					
(b) *Receipts.*									
1. By sale of betel leaves at Rs. 2 per basket of 6,400 leaves—1st year, 4 pickings, 100 baskets for each picking. 2nd year, 24 pickings, 100 baskets each time, third year 36 pickings, 50 baskets each time. ...	800	0	0	4,800	0	0	3,600	0	0
2. By sale of *agathi* leaves at 2 annas a bundle—400 bundles in 2 cuttings in the first year, 2,000 bundles in 10 cuttings in the second year, and 900 bundles in 6 cuttings in the third year.	50	0	0	250	0	0	112	8	0
3 By sale of plantain bunches (175) at 6 annas each.	65	10	0	65	10	0	65	10	0
4. By sale of plantain leaves, vegetables grown in the garden, etc.	10	0	0	50	0	0	30	0	0
Total. ...	925	10	0	5,165	10	0	3,308	2	0

Grand Total.	Rs.	9,899	6	0	
Gross income for three years	,,	9,899	6	0	
Gross expense for three years	,,	3,135	0	0	
Net profit for three years	,,	6,764	6	0	
Net profit per annum	,,	2,254	12	8	or Rs. 2255/-

This amount has to be shared by about 15 cultivators, so, the net gain per cultivator per annum, will be about Rs. 150.

(vii). *Marketing*. The chief market for the leaves, is the city of Madras. Every day about 3 p. m. all the betel vine growers of the village assemble in a common place with the gathered leaves, cleanly washed, counted and arranged in baskets. The unit of sale is one *Kavuli* or hundred leaves. Merchants from the city come to the spot, the price for the day is fixed, and sales are effected.

Some years back there was considerable demand for these leaves from Northern India, but now-a-days those far off markets, have been reported to be captured by the betel vine growers of Sankaridrug (Salem District) and other places.

Pests and Diseases. The betel vines of these parts do not suffer from any insect pest, but the wilt disease is causing considerable damage. About 20 years ago each garden is reported to have fared well up to six years. Gradually, due to wilt disease, the life has been reduced and the gardener must now consider himself lucky if it survives for full three years. Recently, cases have been noticed where the vines have begun to wither even in the second year. The main cause of wilt disease is reported to be due to (i) cultivation of vine in the same land without adopting any rotation, or (ii) keeping the trenches always moist, a condition much favourable to the growth of the fungus. The ryots abandon the gardens when the disease has advanced to a fair extent.

The *agathi* 'standards' have been found to suffer from two insect pests, (a) Agathi stem borer, (*Azygophleps scalarids*) and (b) Agathi weevil (*Alcides bubo*). Generally these appear only as minor pests, but some times the attack may be severe. When the *agathi* plants are very young, if these pests appear on a large scale, the plants never grow above two feet, and in such cases also, the ryots abandon the garden and start afresh.

Phaseolus sublobatus Roxb. A new green manure and forage plant.

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A specimen of a leguminous plant (*Phaseolus sublobatus* Roxb.) known in Tamil as *Karum payar* was received from Sri. C. S. Seshagiri Ayyar, Agricultural Demonstrator, Perambalur, Trichinopoly District, for identification and on requisition he has given the following information regarding its cultivation in the Trichinopoly taluq.

An area of about 10,000 acres is grown under this plant in the Trichinopoly taluq as a mixture with irrigated *Cumbu* (*Pennisetum typhoides* Stapf and Hubbard) from April-May to July-August. After the harvest of the *cumbu* crop, the *Karum payar* crop is allowed to be grazed by cattle or used as green manure by puddling *in situ* for the next paddy crop. The plants which are grazed by cattle will soon shoot up and give sufficient quantity of green manure. The crop is also raised as a mixture in dry lands with cholam (*Sorghum* sp.) red gram (*Cajanus Cajan* (Linn) Millsp.), etc., and from this crop seeds are gathered for sowing in the next season. Seeds are not collected when it is grown in the wetlands. This green manure crop is preferred by the ryots first because it does not smother *cumbu* like

Daincha (*Sesbania bispinosa* (Jacq.) Fawcett and Rendle) and secondly it readily decomposes when puddled unlike *Daincha* which develops much wood if the paddy sowing season is delayed.

Phaseolus sublobatus Roxb. (Tam: *Karum payar*; *Mukani, Mataki,* Bombay; *Ghora Mung,* (Assam) is very closely allied to *Phaseolus aureus* Roxb. (green gram), of which it may be the wild form. It is also allied to *Pillipesara* (*Phaseolus trilobus* Ait.,) the famous green manure plant of the Telugu area. *Phaseolus sublobatus* Roxb. is more robust than *Pillipesara.*

It is found in the hills of Deccan and Western Ghats up to 6,000 feet altitude. It also occurs in the Konkhan, Bihar, Bengal and Ceylon.

The seed is rich in protein and is largely used as food in the Deccan during famine periods.

William Roxburgh in *Flora Indica* describes it as an annual while J. D. Hooker in *The Flora of British India* and T. Cooke in *The Flora of the Presidency of Bombay* describe this plant as a perennial herb. The following description of the plant will be helpful for its identification. Stems twining when meeting support, sometimes suberect, slender, clothed with spreading or deflexed reddish-brown hairs. Leaves three-foliolate; petioles 6—9·5 cm. long, channelled, very hairy; stipules 8 mm.-1·5 cm. long, ovate-oblong, hairy, slightly ciliate, attached a little below the middle. Leaflets, the terminal the larger and ovate or rhomboid-ovate, equal-sided, with cuneate base, 4·5—8·5 cm. long, usually as broad; the lateral ovate-acute, inequilateral, with rounded or truncate base, 3-8 cm long, usually as broad, acute, silky-hairy on both sides, occasionally somewhat three-lobed, conspicuously three-nerved from the base; petioles, middle one, 1·8—2·2 cm. long, the lateral ones 3-5 mm. long, hairy; stipels linear-subulate. Flowers in short close 6-12 flowered recemes with swollen nodes; peduncles 1-3 cm. long, hairy; pedicels very short, 2 mm. long; bracts ovate, nearly 2 mm. long acute, ciliate, deciduous; bracteoles 3 mm. long, linear-subulate, ciliate, prominently nerved, deciduous. Calyx 3 mm. long, glabrous, shortly ciliate; teeth, shorter than the tube, deltoid.

Phaseolus sublobatus, Roxb.

Corolla 8 mm-1·2 cm. long, yellow. Pods 5·5 cm. long, slightly compressed straight, clothed with short reddish-brown hairs. Seeds 8-12, oblong with truncate ends, 2-3 mm. long, dark-brown and mottled.

This promises to be a very useful green manure plant suitable to be grown both in dry and wet lands. Cattle readily graze this even though it is beset with hairs. It therefore deserves to be tried under diverse conditions of soil and climate.

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Better Methods of Virginia Tobacco Cultivation in Guntur District.

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Introduction. Guntur district has nearly 50 per cent of the total area under tobacco in the Madras Presidency. During the past decade, as a result of persistent efforts of the India Leaf Tobacco Development Company, ryots have taken to the cultivation of Virginia tobacco and its curing in barns. The present area extends over 1,00,000 acres, fetching a return of about one and a half to two crores of rupees to the District. The country tobacco (*Natu*) extends over 50,000 acres and it may fetch another half a crore of rupees every year. Virginia tobacco produced in the Guntur, Kistna and Godavari districts forms the bulk of cigarette tobacco produced in and exported from India. With proper methods of cultivation, curing and marketing, it is possible in course of time to find a steady market in foreign countries especially the United kingdom for a fairly large quantity of high class leaf. Tobacco is at present the main 'money' crop in the Guntur district. Unless proper steps are taken to increase the yield and improve the quality of leaf and rectify some defects in other respects, the trade is likely to suffer in a very short time.

Importance of quality in Virginia Tobacco. Unlike other agricultural commodities, and other varieties of tobacco, the range of variation in the market price of Virginia tobacco, even on the same day, may be anywhere between Rs. 10 to 350 per candy of 500 lb. This indicates the extent to which quality is important in the crop. The aim of the Virginia tobacco grower should therefore be to produce as much of the high grade leaf as

possible to obtain better prices. There is always a good demand for high grade leaf for which remunerative prices are offered. Steps are being taken in several parts of India to introduce and extend Virginia tobacco cultivation. Naturally Guntur District is not likely to enjoy its present monopoly of trade in the commodity for long. It has also to be mentioned that of late virginia tobacco in the district has been showing considerable deterioration in quality and yield. On the other hand, it is behaving very well in some of the new areas along the Godavari and Kistna rivers. There is no doubt that Guntur District is one of the few places where good quality Virginia tobacco can be grown. Hence Guntur can still hold the monopoly if the ryots adopt judicious methods of cultivation and curing.

Factors affecting quality in virginia tobacco. The quality of cured leaf obtained is determined by a number of factors and they can be classified as follows :—

(a) Field factors affecting the development of proper colour of the leaf.

1. **Rainfall before and after-planting.**
2. **Nature of previous crop.**
3. **Manuring given to previous and present crop.**
4. **Time of planting.**
5. **Nature of seeds and seedling used.**
6. **Season during the growth of the crop.**
7. **Prevalence of pests and diseases.**

(b) Those affecting quality of cured leaf during the process of harvest and curing :—

1. **Method of harvest and handling.**
2. **Method of curing and handling.**

A good quality leaf from the barn is obtained from the crop that matures uniformly and produces the right type of yellowish green colour in the leaf. Factors such as rainfall are beyond control while the occurrence of pests and diseases are to some extent within human control. Proper methods of rotation and manuring, timely planting and use of pure seed can, however, be followed and they go a long way in producing the proper type of crop.

To produce good colour in the green leaf, virginia tobacco should not be grown on the same field more often than once in three years. It should not be preceded by a pulse crop or groundnut or by a heavily manured crop like chillies. Cereal crops have been found to be the best to precede it. If for any reason, cereals could not be sown in the preceding *pyru* season, the land should be manured liberally and a fodder crop (e.g. maize) raised from June to August. Tobacco can be planted in October-November following. In brief, the preceding crop should not be one that will enrich the soil in its nitrogen content, a factor that will adversely affect proper colour development in the green leaf. Raising tobacco too frequently on the same land will favour the spread of pests and diseases. Early planting (September end or early October) is good, whereever it is possible. Planting later than 15th December is undesirable as the resulting crop will not ordinarily develop sufficiently good colour in the green

leaf. Late planting is however, inevitable in some of the low-lying *Badava* lands. It is inadvisible to attempt planting in heavy deep clays, where good drainage faciliaties do not exist, before the cessation of the North East monsoon.

The most important factors adversely affecting the quality of leaf during harvest and curing are the following.

i Entrusting harvest and subsequent processes on a contract basis to a gang of coolies who pick over-ripe, ripe and un-ripe leaf together, and cause mechanical injury to the leaf while handling it.

ii. The absence of sufficient attention paid to curing methods by curers who do not understand the technique of curing.

iii. Curing over-ripe, ripe and under-ripe leaves together.

iv. Over loading the barn.

Contract work is usually cheap but the results are usually disappointing. If the grower exercises sufficient supervision in the field and at the barn, several defects of the system can be remedied. As bad curing results in loss of 25 to 50 percent of his profits, the grower would do well to learn the art and do the barn curing himself. If he cannot do it, he should at least procure the services of a good curer. It does not pay the cost of coal to cure the over-ripe, ripe and under-ripe leaves together.

Since two to four leaves are picked from each plant at a time, the stage of maturity will be different in each case. Experience has shown that it is desirable to sort out the green leaf after picking, into three grades with reference to their colour, and string them separately. The darker green leaf should be arranged on the top tiers the light green on the middle tiers and yellowish leaf on the lower tiers. The higher temperature near the flue pipes gives the over-ripe leaf at the bottom a chance to cure without sponging and the lower temperature and higher humidity at the top allows the dark green leaf to turn yellow quicker. The usual blemishes noticed in the cured leaf such as 'sponging', scalding, etc. are the result of over loading the barn with too many sticks, a habit which is almost universal in the district at present. By overloading, the leaves are kept so closely packed that some of them will not have the full benefit of the changes in temperature, aeration, and humidity to the right extent and at the right time, with the result, that they fail to cure well. The more thinly the barn is loaded the greater the possibility for the uniform distribution of temperature, aeration and humidity in it. What is gained in fuel consumption by loading the barn with too many sticks is many times lost in the quality of the cured leaf produced. It is known by experience that about 600 sticks in the small barn (16′ × 16′) and about 1,000 sticks in the big barn (20′ × 20′) form the optimum load.

How best to manure a Virginia tobacco crop:—To maintain yields at a high level and produce the right quality of leaf, it is necessary to manure the land in the right manner. Cattle manure in sufficient quantities is not available in the tract as nearly 15 to 20 acres are cultivated with a pair of

cattle. Heavy application of cattle manure induces rank growth resulting in dark-coloured coarse leaf which is totally unfit for barn curing. The use of artificials to supplement the natural resources of the soil, is therefore inevitable.

Nitrogen, besides assisting in the vigour and growth of the plant, has a marked effect on the quality of leaf. If a soil is poor particularly in its nitrogen content, light coloured leaf is produced. If heavy doses are applied, big coarse, dark green leaf with prominent veins is produced. Cattle manure, oil cakes, ammonium sulphate and nitrate of soda are the usual nitrogenous manures now available in the market. Black soils are generally rich in total potash. But as tobacco is a heavy potash feeder (about 100—150 lb. K_2O per acre per year) and as potash influences the quality of leaf, the available potash in the soil will not fully meet the needs of the crop. Potash manuring is, therefore quite essential for tobacco. A crop suffering from potash starvation will have in the leaves yellow mottling, dead specks, hobby-surface, and downward incurving tips and margins when green. Such leaves become harsh, dry, short and non-elastic when dry. Potash helps to improve the elasticity and fire-holding capacity of the leaf. The sugar content of the leaf is also improved by the supply of potash. Potash in the soil is rendered available by the application of sodium nitrate; hence the suggestion to apply half the quantity of nitrogen to the crop in the form of sodium nitrate. But there is the inevitable danger of leaching out of the nitrate during the heavy rains of September—October. Too much of potash turns the ash dark in colour. Phosphoric acid assists in an early, healthy development of the crop, regulates the rank growth resulting from too much nitrogenous manuring, hastens maturity and aids in the general colour development of the leaf. Lime is not required in Guntur soils which are rich in lime. If the burning quality (closer burn) is bad and snow-white ash does not result, about 30 lb. of magnesia (MgO.) with half of it at least in a soluble form, may be applied. Tobacco does not ordinarily require any other manure to improve its yield or quality. Under Guntur conditions manuring with about 10 to 15 lb. of nitrogen (N), 50 lb. of potash (K_2O) and 75 lb. of phosphoric acid (P_2O_5) in addition to 5 to 10 cart loads of cattle manure per acre appears to be the best dose. Some fields do grow good tobacco without manuring or with moderate quantities of cattle manure in certain seasons, but to ensure good crops of tobacco over a length of time, systematic manuring with artificials is inevitable.

Nitrogen is best applied as ammonium sulphate and sodium nitrate in equal proportions (25 to 40 lb. ammonium sulphate and 32 to 48 lb. sodium nitrate per acre), potash as sulphate (100 lb. potassium sulphate per acre), and phosphoric acid as superphosphate (450 lb. super-phosphate per acre.) Undue proportion of chlorides should not be included in the mixture. The above suggestions are based on the general conclusions drawn from the elaborate manurial trials carried out over a number of years and on various soil types by the Indian Leaf Tobacco Development Company. Cattle manure

is best ploughed in, in June—July and artificials drilled deep into the soil or spread over the soil and ploughed in whenever there is a dry spell of weather in August, i. e , about two months before planting. As tobacco is grown dry in the district, the full benefit of the manure applied cannot always be realised by the crop unless it is applied sufficiently early and well worked in.

Use of pure seed. The purity of the Virginia tobacco crop in the district is poor. With a mixture of indifferent types the cured leaf will be far from satisfactory. The use of pure seed (strain) of proved merit results in a pure crop that matures uniformly. This will naturally result in the production of a uniform quality of cured leaf. In no other crop does purity of seed play such an important part. Harrison special No. 9 has been found to meet the needs of the district very well. It grows well, has an ideal type of leaf and develps good colour wherever conditions are favourable. Growers have reported favourably on it. As compared to the local bulk crop, it fetches them an additional net profit of at least Rs. 25 per candy of produce As natural crossing is very common in this crop, it is not always the most vigorous plant in the field that is to be selected for seed purposes. Till a uniformly good quality crop is raised by the ryots themselves, they are advised to purchase their seed requirements from the Agricultural Department which is multiplying the pure strain and doing its best to supply as much seed as is wanted by growers. The price of pure seed required for an acre of planted crop is about 2 annas.

Raising nurseries. Under the present system of cultivation in the District, though a few big ryots raise their own nurseries nearly 75 per cent of the ryot population entirely depend upon the nurseries raised by professional nurserymen. This system has come into vogue for the following two reasons :—

i. Nurseries have of late been failing in black soils due to 'damping off'.
ii. It is easier to raise nurseries with success in the sandy soils and light loams, and seedlings from these areas establish much better on planting than those from the black soils.

In Guntur virginia tobacco cultivation has, assumed such industrial proportions that the man that raises the nursery is very often different from the man that grows the crop, the grower different from the barn owner and the barn owner different from the grader and ultimate exporter. As purity in the seedling stage cannot be easily determined, nursery men take little care to use good seed and the man that grows the crop pays the penalty. It is therefore highly desirable that this system vanishes soon. The next question is how best to raise tobacco nurseries in black soils. Before the I. L. T. D. company thought of raising nurseries in the Chirala sands, ryots were raising their nurseries in the black soils with success. Similarly, on the Agricultural Research Station, Guntur representing a typical black soil area, good nurseries are being raised with success from year to year. It

should therefore be possible to raise nurseries in the black soil areas. To achieve success, the present methods of raising the nurseries have to be modified and any amount of attention bestowed on them will not be too much.

The following are some of the precautions to be taken while raising a tobacco nursery in heavy black soils :—

i. Select a fertile high level sloping bit of land with a good water source such as a tank, pond or well near at hand. The water table should be so low that there is absolutely no danger of inundation or bad drainage even in the heavy rainy season.

ii. Make the soil permanently lighter in physical texture by heavy application of sand, tank silt, organic matter and green manures, to facilitate free movement of soil moisture.

iii. If chillies are also raised, tobacco and chilli nurseries should be rotated. Otherwise two plots may be set apart for tobacco and alternately put under tobacco nurseries.

iv. Plough the land deep after the North-east monsoon and apply liberal quantities of cattle manure, in December or January, and work it in well with the plough.

v. Keep the land ploughed till the end of July, then lay it out into a number of long beds, 4 to 5 feet wide with intervening drainage channels $2\frac{1}{2}$ feet wide and about 1 foot deep ranged along the slope, to facilitate quick drainage. The length of the bed may be adjusted with reference to the length of the field and general slope of the land. Periodical deepening of the drains and earthing up of the beds are necessary.

vi. About 3 or 4 days before the proposed date of sowing the seed beds, a fairly thick layer of cotton or red gram stalks, rejected cattle fodder, organic rubbish from the manure heap, casuarina twig, groundnut husk or any other type of inflamable materials may be spread evenly over the prepared nursery beds, and set fire to. This is best done when the air is still. The beds should not be burnt when they are too wet. As soon as the bed cools down, the ashes may be worked in lightly with hand hoes to prevent the ashes being blown off by wind. The beds are then ready for sowing.

Sowing of nursery beds. The beds should be raked and moderately compacted. The seed should be mixed with plenty of ashes or fine sand and sown evenly, distributing it twice across at the rate of about an ounce for a bed measuring 5' × 150'. An ounce of tobacco seed contains about 3 lakhs of seed. The seed should then be pressed down with the palm of the hand or a flat board after sprinkling a small quantity of burnt soil on the sown beds. The practise of applying powdered cattle or sheep manure to cover the seed or just before sowing seed should be avoided as the manure may infect the soil with the fungus responsible for "damping off,"

Watering should be done with a fine rose-can till the plants are about three weeks old. Covering seed beds temporarily with casuarina leaf in the stages as adopted by ryots at Bapatla and Chirala is a practice worth copying.

After-care of nursery beds. Burning is done to kill the soil organisms that cause 'damping off' 'blackleg' etc. With favorable weather conditions, they attack the seedlings causing rotting and death To avoid these diseases the beds should be thinned out wherever they are too thick. The thinnings may be planted where the beds are patchy. Such transplanting can be done when the leaves are the size of an eight-anna piece. If the seedlings are very weak or fail to do reasonable progress, sulphate of ammonia may be applied at about 5 to 20 ounces for a bed of 250 feet length. Similarly when the rate of growth of the seedlings has to be accelerated after a batch of seedlings are removed from the bed, the bed may be manured at 12 to 25 ounces ammonium sulphate for a bed of 250 feet length. The manure should be well mixed with sand or dry earth and evenly broadcast over the beds in the evenings. A heavy watering should be immediately given. As the plants usually become soft after manuring, at least a week should elapse before the seedlings so manured are ready for planting out. Even when manure is not applied, the seedlings should similarly harden off for about a week before being pulled out for planting. If proper attention is paid to weeding, control of insect and fungus attacks, an acre of nursery is expected to supply seedlings sufficient to plant at least 100 acres with sufficient seedlings left over for subsequent filling up of gaps. In black soils, many more seedlings can be expected from a unit area of nursery. At present ryots use at least five times the above seed rate to start with and sow more seed in the same beds whenever the nursery looks thin according to their own standard of judgment. In the majority of cases it is this thick sowing that encourages 'damping off'. In addition to the precautions mentioned above a weekly spraying with a suitable spray mixture containing a fungicide and insecticide is found useful to protect the tiny seedlings from diseases and pests. The first spraying should be done when the leaves of seedlings have attained the size of one's finger nail. The following mixture is recommended for the first two sprayings:—

Bouisol (Colloidal copper)	1 oz.
Lead arsenate	¼ oz.
Agral (spreader)	⅛ oz.
Water	1 gallon.

If the above preparations are difficult to obtain, the following spray mixture is recommended.

Copper sulphate	1 lb.
Quick lime	1 lb.
Lead arsenate	4 oz.
Water	12½ gallons.

The copper sulphate is dissolved in half the quantity of water. The quick lime is first slaked and then diluted in the remaining quantity of water. Copper sulphate solution is added to the lime solution slowly and the

mixture thoroughly stirred during the process. Lead arsenate is added to the mixture and thoroughly stirred.

Periodical sowings. For convenience of planting and to reduce risks to the minimum, big cultivators are advised to sow their nurseries at intervals of a week or so, preferably in different places, so that, if for any exceptionally unfavourable weather conditions at a particular time one sowing cannot be saved, at least the others may be saved.

Watering. The amount and frequency of watering to be given to the seed beds in the black soil areas are different from those in the sandy soils, and ryots should use their judgement in this respect. They are more often damaging their nurseries by over-watering in these soils. Water thoroughly at *longer* intervals rather than frequently.

The following additional hints are helpful for raising a good crop.

1. Do not use any tobacco refuse or sweepings from barn yards for the nurseries. Diseases like mosaic powdery mildew etc. and seed contamination may take place through this source.

2. Reject beds that show mixtures and rogue out off-types if they are few and can be detected in the nurseries.

3. Use seedlings of the same age for planting a field as otherwise all plants do not come to maturity at the same time.

4. Reserve enough seedlings in the seed beds for gap-filling as the resulting crop will be uneven and impure if seedlings for this purpose are obtained from another source.

5. Try to fill up gaps as early as possible to get a uniform crop at maturity.

Tobacco seed a useful bye-product. An acre of Virginia tobacco on an average gives 200 lb. of seed and most of it is at present wasted. Recent investigations have shown that tobacco seed yields 25 to 30 per cent oil in country wooden mills as against 40 per cent yield of gingelly seeds. The quality of oil compares favourably with high class gingelly oil in colour, taste and flavour when extracted in the country mill. Oil extracted by the hot drawn process tastes some what bitter. Sheep and goats freely eat the seed without any untoward consequences. Cattle also seem to relish the seed, but these are rarely fed with it for fear of bad consequences.

From the reports received so far, it is clear that the oil and cake are free from harmful substances. The cake compares well with castor cake as manure. The oil can be classed as a semi-drying oil with some special properties of its own. At a modest estimate, valuing the oil on a par with linseed oil and the cake with castor cake, an acre of tobacco may yield a net return of Rs. 12 deducting Re. 1 for harvest and threshing the fruit capsules and Rs. 5 for the extraction of oil.

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A. Pests: Appendix—Pests and Diseases of Virgina Tobacco in Guntur.

Name.	Nature of injury.	Control measures.
1. Tobacco Caterpillar *(Prodania litura* F.)	A severe pest of the planted crop. Caterpillars feed on the foliage both in the nurseries and transplanted areas.	Spraying of lead arsenate at a strength of one oz. in two gallons of water. Hand picking of caterpillars wherever possible.
2. Tobacco nursery caterpillar (*Laphygmaexigue* Hb.)	A severe pest of the nurseries at Chirala where large scale nurseries are raised. Caterpillars devastate the nursery beds by feeding on the newly formed leaves of the sprouting seedlings in the nursery beds.	Growing a trap crop of *ragi* all round the tobacco beds and pulling it out at 5 to 6 days interval for the destruction of the egg masses and cater pillars on them. Alternate sowing and pulling out has to be done at 6 days intervals.
3 Plant lice (*Myzus persicae* S.)	A pest of planted crops. Severe in the lankhas of E Godavary. Colonies of insects infest the leaves, suck the sap and affect the vigour of the plant. Causes curling of leaves.	Spraying with tobacco decoction plus soap.
B. Diseases etc.		
1. Damping off, (*Pythium* Spp. *Rhizoctonia* Sp.)	Occurs in the nursery. Seedlings attacked at ground level. They fall over and rot. Seedlings are destroyed in patches.	Use of raised, well-drained seed beds. Burning of nursery beds by open fire method. Thin sowing. Regulated watering. Periodical spraying with a fungicide (see text).
2 Black leg. (*Bacillus aroideae*)	Occurs in the nursery. Blackening of the seedling and death. Seedlings are destroyed in patches.	do
3. Powdery mildew. *(Erysiphe cichoraceaarum*).	Occurs in the transplanted crop Rare in the nursery. Forms a white powdery layer over both surfaces of leaves; favoured by dry weather and cold nights and shady situations.	Dusting with flowers of sulphur in the nursery stage. Priming (removal of lower leaves) the grown up plants up to height of 12 to 15 in. from the ground level. Application of ground sulphur to the soil immediately around the stem.
4. Orobanche. (a flowering root parasite)	Causes stunted growth due to the parasite sending its roots into the roots of tobacco.	Pulling out the parasite as soon as the shoots appear above the ground. Burn or bury deep the pulled out plants. Avoid feeding the pulled out parasite to farm animals and prevent them grazing on the parasite.
5. Mosaic. (Virus disease).	Mottling of leaves caused by alternate light and dark green patches. Blistering in severe cases. Stunted growth and production of narrow leaves lacking in 'body', Poor quality of cured product.	Sterilisation of seed bed soil or yearly change of site for nursery beds; thorough cleaning of the seed. Cleaning up of stems, trash &c. from the site of beds. Weeding out of ratoon tillers, stubbles and solanaceous weeds from the field. Examining nursery beds and roguing out mosaic infected seedlings. Roguing of plants at the first cultivation of the transplanted field.

SELECTED ARTICLE

The Man and the Plant.

By H. MARTIN LEAKE, M. A. Sc. D.

Cotton is an agricultural product, the product of a plant. Its successful cultivation, apart from the financial aspect, must conform, therefore, to two requirements. It must provide both the essential conditions which the nature of the plant as a living organism demands and the amenities which man, the producer, considers to be his due in return for his labour. But there is no question as to which of the two is the more fundamental. The plant is a sentient, but unreasoning organism and can only adapt itself to a certain limited range of conditions. The plants in a greenhouse will die if left unwatered for a few days, and the fact that the absence which led to the neglect was unavoidable makes no difference to the result. With man the vital limits are wider, but he is reasoning and not only can, but does, voice his protests in strikes and rioting long before those limits are reached. This is a simple proposition, but one which is frequently over-looked. The human requirements, for the above reasons, assume primary importance, and the protest of the plant, because silent, is ignored.

The cotton plant, with plants in general, will only grow and mature its crop if the conditions, and the environment, fall within somewhat narrow limits. If rainfall, air-humidity temperature and so on transgress those limits failure will result, though a time-factor is here involved, the extent of the injury being dependent on the duration of the exposure to the adverse factors. These are physical factors, but they are not the only ones concerned; there are the factors concerned with the soil also physical factors, and there are biological factors which influence the resultant crop, weeds, pests and diseases. It is the function of the successful farmer so to alter the conditions existing in nature that the plant throughout its growth is never subjected to such adverse conditions. It is an objective rarely, if ever, attained, for man has only a partial control over the environment. Herein lies the fundamental difference between agriculture and industry; in the latter the conditions are under the full control of man.

There is here implied the dependence of success on a detailed knowledge of the particular plant in relation to the environment, and it is a knowledge which is of two kinds. There is the knowledge which concerns the effect of those rapidly changing factors of the environment, seasonal and daily changes of temperature and rainfall. These require immediate action, and decisions must be taken by the cultivator himself. It is knowledge which has been acquired by farmers of all races in greater or less degree as the result of the accumulated experience of generations. Then there is the knowledge of those more subtle influences, nature of the soil, availability of plant food, the life-histories of the various pests and diseases and so on the prerequisite to control. These are technical matters which require and technical investigation to acquire and technical control to apply.

It is possible, in view of the above, to define agriculture as the adjustment of the environment to the needs of the particular crop plant—perhaps the most comprehensive definition of agriculture there is. To achieve this objective three conditions must be fulfilled: skill on the part of the farmer, technical investigation, and technical control. But there is a further aspect. Where the conditions of growth cannot be sufficiently altered to suit the plant's requirements, it is often possible by careful search to find a variety which is capable of

growing under the conditions better than any variety hitherto available. It is a process which has been adopted instinctively through the ages and now forms a standard operation with all crops and in most countries. But recent advances in the technique of plant breeding have gone further and rendered it possible within reasonable limits to manufacture varieties having the desired adaptability. This alteration of the plant to suit the environment is a matter for technical investigation.

The human aspect demands requisites of a different nature. Primitive man is readily satisfied with little more than the absolute essentials to maintain life-food and a minimum of clothing and shelter—but this simple state is everywhere passing. With the spread of education, news and facilities generally, he is coming to recognize that there is a more desirable standard of life only to be obtained by the retention of a larger fraction of the return for his labour. It is inevitable that this urge on his part should bring him into conflict with those who handle his product and are naturally unwilling to reduce their share of the return. As long as demand exceeded supply, as was the case until early in the present century, this adjustment could be made within reason at the expense of the ultimate consumer. But latterly, contracted demand and vast increases in supply have made adjustment by such a method impossible. These forces have created conditions under which not merely has it become impossible to maintain the progressive advance in labour's material welfare, but actual reduction has taken place in some cases. If the labour force engaged in tropical agricultural production has progressed in its views as to what constitutes an adequate standard of life, it has not yet learned to appreciate the influences at work which restrict its capacity for earning Herein lies the stimulus to the unrest which has characterized recent years not only in the tropical colonies but in general. Being capable of action labour has protested, and often with violence, and the strength of the movement of unrest has forced the human needs to the front, not infrequently to the neglect of the more fundamental needs of the silent plant. In practical life it is no answer to say, if the facts do not fit the theory, so much the worse for the facts. Facts have an unpleasant way of asserting themselves, and a solution to the present problem can only be sought through a recognition of its dual nature. The solution will not be found through argument on *a priori* grounds; the best approach will be made through a review of the various systems found in action and of the response in each to the changed conditions.

During the early history of colonial development a purely nationalistic view prevailed: development in the interests of the mother country, as witness the Navigation Laws and the slave trade. Under it arose a system of plantations worked by a labour force composed originally of slaves, and later of wage-earners often bound by indentures. With the passing of slavery a change of sentiment took place which slowly crystallized out at the end of last century in the dictum of Chamberlain: the trust for civilization. Under it, the insistent demand for the products of tropical agriculture was to be met by extended cultivation by the readiest means then available. The plantation system, and the results are to be traced in the encouragement of settlement in Kenya. It was assumed rather than argued that from such a development benefits must automatically accrue to the native populations. Another quarter of a century elapsed and a further change of sentiment took place which crystallizes out in Article 22 of the Covenant, the trust of the native populations. It was a sentiment which Lord Lugard, with a prescience in advance of his time, anticipated by a quarter of a century. The readiest means were discarded and the more leisurely method through a system of peasant proprietors was adopted, and this course was facilitated by the lessening urgency of the demand owing to the large extension in the sources of supply. It takes note of the human aspect and again, it was

assumed rather than argued that the needs of the plant would be adequately met, These two systems, existing as they do in a vast variety of forms and admixture. have supplied in the past practically the whole of the agricultural produce which comes on to the markets from the tropics The test of their efficiency to supply both requisities is found in the reactious during the recent years of depression.

The plantation system, in its highest development, that of the large company-owned estate, is in a position to provide the requirements of the plant, finanical considerations alone determining whether adequate provision will be made or not. Irrigation works will be provided if the extra return is calculated to cover the cost and processing plants to handle the product can be erected, technical control and even investigation can be organized, while much of the details of cultivation will be directed by a system of supervision which leaves little or nothing to the initiative of the manual worker. The latter is paid a fixed wage, and his interest in the success of the undertaking is limited to the chances of loss or continuance of employment. The small plantation has a lesser capacity owing to the limited financial status of the owner, but the position of the manual worker is the same in both cases.

The demand of labour here takes the form of a claim for an increased wage, which carrying as it does no incentive to greater energy, is naturally resisted as far as possible. The outcome will depend on the relative bargaining power, and where labour has an alternative field of employment, it is the employer who must yield; where no such alternative exists, it is labour that must do so. But the matter does not end there. The general reaction, especially where labour is in the stronger bargaining position, is for a resort to be made to mechanization with higher wages to a restricted labour force. It is a solution which has answered well where there is a shortage of labour as in Hawaii, but one which has had bad repercussions where there is an excess of labour as in some West Indian Islands, and notably in Cuba and Puerto Rico There is no general solution to the problem here.

The peasant system appears to accord more closely with the human requirements, for the peasant is his own master and works for his own benefit. But agriculture among a tropical peasantry is not founded on accumulated experience and there are not the financial resources for technical control and, still less for technical investigation. Processing plants, which may be necessary if the product is to be acceptable in a competitive market, cannot be erected, and the regulation of a seed supply, so important an item in the case of a naturally cross-fertilized crop raised annually from seed such as cotton, is impossible. Some outside agency has to provide these, and in most cases that agency is Government. There has thus arisen in place of the independent employer—between whom and labour Government could, in the last resort, arbitrate—an authoritarian control against which there is, and can be, no appeal, for the final arbiter, Government, is one partner It is only necessary to read the cotton Ordinances, Rules and Regulations of Uganda or the like enactments of Zanzibar for cloves and copra to appreciate the extent of the arbitrary power which Government has been forced to take to itself. This is the inevitable result of the failure to realize that an uncontrolled peasantry cannot "deliver the goods". Herein lies the cause of the unrest which has in recent years characterized countries with a peasant system no less than those with a plantation system. Government, it is true has drifted rather than deliberately entered into this position, and is seeking a way out through co-operation. On the question of co-operation it can here only be said that, for success on the scale needed a standard of education is required which can hardly be attained in the time which the urgency of the problem demands.

It is not possible in the brief space at command to argue the intermediate positions of a mixed peasantry and plantation in all their varieties. Such a case is found in Mauritius, and unrest has not passed by that island It is difficult, therefore, to avoid the conclusion that the dual requirements are provided neither by the plantation nor the peasant system alone or in combination. The remedy must be sought elsewhere.

There are fortunately in operation two developments which promise to provide the solution, one in Fiji and one in the Sudan and if the first is here taken as an example, it is because it gives in many respects a clearer picture of the principles and is less well known to cotton interests. The Fijian sugar industry in the past was worked on the plantation system with labour under indenture from India. Unrest was rife and kept within bounds only because settlement on the extensive tracts of waste fertile land offered an alternative field of securing a living, and because fresh supplies of labour were readily recruited in India. These conditions were brought to an abrupt end in 1917 when the indenture system was abolished, and an acute labour shortage followed. The solution of the deadlock was found in the subdivision of the large estates into small holdings leased to the tenantry, and the organization of a technical supervisory service of which the guiding spirit is co-operation with the tenantry. The result has been so successful from the industry's side that it places its sugar on the world's market with profit, and from the labourers' side in that an intense demand for tenancies has arisen and the whole of the area controlled with the exception of certain small portions retained for trial purposes, is now so subdivided. Here, both requisites are met and it is along such lines that the general solution of the present troubles must be sought. *The Empire Cotton Growing Review*, (16: 180–185.)

ABSTRACTS.

Soya Beans.—Arnold, H. C.—*Rhodesian Agricultural Journal* 38, (1940). 588—606.

The introduction of strains of soybeans which yield good crops of seed and also retain their seed in their pods long enough to allow a reasonable period for reaping, appear to make the cultivation of this crop economically possible. The choice of a variety suited to the district is of the utmost importance. Potchefstroom No. 184 is the best yellow-seeded and the Jubiltan strains are the best fodder varieties, but seed supplies of these are at present very limited. Rainfall and soil conditions suited to maize are the best for soya beans also Seed requirements are 40 to 50 lb. of the large seeded and 15 to 20 lb. of the small-seeded kinds, per acre. Twenty-four inches between rows and 3 to 4 inches in the rows may be considered as standard spacing for the yellow-seeded kinds, but the distance between rows may vary from 8 inches to 30 inches if compensating differences are made in the spacings between plants in the rows. Depth of planting should be between one and two inches and on no account exceed three inches. Bacterial inoculation of the seed is advisable when the land is sown for the first time. Early and thorough weeding is imperative. Harvesting may commence when the seed reaches the hard-dough stage. The stalks should be tied in bundles and stooked as soon as they are dry enough. Three to four bags per acre could be expected from fairly well attended farm crops, though twice that amount has been obtained from well manured land.

Its high protein content makes it especially valuable for balancing foods of a starchy nature, and it can be used as a substitute for animal proteins in the diet of both Europeans and natives. The valuable nutrients, protein and oil, can be transported more economically as soya beans than is possible in the form of either maize, wheat, groundnuts or beef. Although the costs of growing would be higher, the marketing costs would be lower than those for maize.

Liebig's Mineral Theory of Plant Nutrition—Acharya C. N. *Indian Farming* 1 : (1940).

It is now exactly a hundred years since Liebig propounded his mineral theory of plant nutrition which stated that plants need be supplied with minerals only in order to provide for normal growth. It synchronized with the change-over from an era of natural or organic manures to a new era, which believes in the potency of artificial fertilizers, properly used. In the early stages of the enthusiasm for artificials, the case for natural organic manures which were in use through thousands of years was overlooked—with disastrous results in several cases by way of a rapid deterioration in the physical condition and fertility level of the soil. The manurial pendulum has now swung to a middle position between the age-long practice of using organic manures alone and the immediate post-Liebig belief in the sufficiency of artificials alone. Present-day practice aims at combining the advantages of both systems by returning to the soil as much of farmyard manure, composts and other natural manures as can be obtained and using artificials as supplements in order to obtain peak yields. The relative amounts of organic and inorganic manures that can be used with advantage for any crop will depend on a number of factors such as the nature of the soil, the nature of the crop and relative prices of the two classes of manure on the farm. Recent work, both on the agronomic and on the scientific sides, has shown the essential limitations of the purely mineral hypothesis put forward by Liebig for the nutrition of plants. Controlled experiments in solution cultures, containing only mineral salts, have shown that though plants can be grown for one or two generations in such media, they deteriorate rapidly if grown through a number of generations with seed obtained from the previous mineral solution cultures. This has been found to be due to the lack of essential phyto-hormones which are carried in small amounts in the normal seed grown in the soil and are found in abundance in organic manures and also in soil organic matter. In the temperate and colder climates, where the soil contains a good percentage of organic matter (5 to 10 per cent) and the rate of oxidation is slow, the return of the root systems of crops may be sufficient to maintain the soil in good physical condition; and continuously high yields may be obtained for decades together by the application of artificials alone, as evidenced by the results of the permanent wheat plots at Broadbalk (Rothamsted). But the case is different in the tropics, where the soil contains barely 1 to 2 % of organic matter and the rate of oxidation of added organic matter is high. The return to the soil of the root-system alone is insufficient, under tropical conditions, to maintain the soil in proper condition. For this purpose additional quantities of bulky organic manures in the form of farmyard manure, composts or green manures, have to be added almost every year. Already, the system of using 'straight' artificials is yielding place to an alternation or conjoint use of organic and inorganic manures M. K.

Feeding of Milking Stock. Kartha K. P. *Indian Farming* 1: (1940).

Cattle improvement in India is as much a matter of feeding and management as breeding. While better breeding may produce an improvement of 10 to 12 per cent in milk yield from generation to generation, better feeding and management alone can be relied upon to produce an immediate increase of 50% in ordinary Indian cattle. Feeding of milch cows in villages is done haphazard without any regard to the requirements of the animals. In many cases, cattle are seriously underfed while in others there is considerable overfeeding, both of which affect milking efficiency. The object of giving food to milch animals is to provide the energy required for performing the various functions. In the feeding of animals, therefore, care should be taken to see that (1) you provide sufficient food for the animal to perform its vital functions viz. the 'maintenance ration', (2) you provide extra food for the production of milk viz. 'the production ration'

and (3) that the quality of the food is such that it contains enough proteins, minerals and vitamin viz, 'a balanced ration'. The quantity for maintenance will depend upon the live weight of an animal and that for production on the amount of milk produced. The actual quantity will also depend upon the quality of the feed. If good fodder is available, a mixture of green and dry fodder fed *ad lib* should provide the requirements for maintenance. If fodder is of poor quality, the maintenance ration should contain in addition 5 lbs. concentrates in the case of buffaloes and 3 lbs. in the case of cows. Production ration is supplied in the form of concentrates like gram, oil-cakes and bran and the optium requirement is one lb. of a suitable mixture of concentrates for every 3 lbs of milk yielded.

The following are a few typical mixtures found suitable for milch cattle.

Mixture.	Bran.	Crushed gram.	Crushed barley.	Crushed cotton seed.	Crushed groundnutcake.
1	4	1	1	–	2
2	4	–	2	–	2
3	4	1	1	2	–
4	5	1	–	–	2
5	4	2	–	2	–
6	4	1	2	–	1
7	3	–	2	3	–
8	3	1	2	2	–
9	5	–	1	–	2

M. K.

The control of Nut grass in the Sudan Gezira. F. W. Andrews. *Empire Journal of Experimental Agriculture.*

Nut grass *(Cyperus rotundus L.)* is reported to be a troublesome weed in the irrigated cotton land of Gezira--a flat plain lying between the Blue and the White Niles. It was found that the eradication of this weed was fairly accomplished if a root cutting implement (corresponding to blade harrow or *Guntaka*) was drawn through the soil at a depth below that of the lowest tuber and the disturbed soil containing the tubers left in a dry condition. A good many of the tubers were about six to nine inches below the ground surface. Repeated cultivation of the land may eventually destroy this weed. M, K. R.

Rice Straw and Molasses for Range Cattle R. C Macahalig. *Philip. Agriculturist*, (1939), 28, 561.

In view of the efforts to widen the basis of an industry hitherto largely dependent on monoculture and to find an outlet for excess molasses these experiments on the use of rice straw and molasses as supplements for grazing cattle will be of interest. During the dry season (112 days) the average increase in weight was 29·43 kg for cattle with supplementary feed against 1·43 kg. for those fed on pasture alone. This was definitely economic. During the west season (196 days) the respective increases were 19·93 and 16 45 kg., a difference which was uneconomic. *International Sugar Journal*, 42 (1940) 256.

Manufacture of "Leesa" Soft Sugar in India. S, D. Agnihotri *Proceedings of the 6th Convention of the Sugar Technologists' Association of India*, pp. 485—486. There are several factories in Bombay producing a soft sugar, e. g., *Leesa* made by crushing refined beet or Java special crystals and mixing it with 9 to 15 per cent of 5A corn glucose (35° Be.) of the Corn Products Co. (India). *Leesa* so made forms hard lumps on keeping, and invert sugar gives a product which is better in feel and in keeping quality. Japanese Leesa appears to contain a fat, which the author was unable to identify. No modern sugar factory in India has undertaken to produce *Leesa*, though from the prices ruling for that imported from Japan the margin is quite alluring. (*International Sugar Journal*, 42: (1940) 253).

Gleanings.

Healthier Plants. From the Horticultural Department of the American Chemical Paint Company comes news of the commercial production of a vitamin hormone stimulant, *Transplantome*, for plants, that not only invigorates old roots but also multiplies the production of new ones, reduces the loss which frequently occurs with transplanting operations, and reduces wilting. It is applied to rooted plants to add to existing root growth and to force their general growth. *Transplantome* is a water-soluble powder impregnated with vitamin B_1 and other parts of vitamin B_1 fraction, plus root-promoting hormones. The hormone initiates root growth and plant physiologists assert that the Vitamin B chemicals are necessary for the maintenance of their growth. That it is quite concentrated is obvious for it requires only one level teaspoonful to a gallon of water to make a stock solution which is then further diluted. Seedlings may be lightly sprinkled weekly, or it may be applied to plants set out in the soil, whether they be trees, shrubs, vines, annuals. or perennials In the case of plants which are set out without a ball of earth, the manufacturer recommends that the roots be soaked in the stock solution for an hour. Treatment usually results in vigorous and extensive root growth and this, in turn, requires more frequent watering than is ordinarily necessary. The manufacturer further claims that, owing to frequent clipping, grass is unable to produce enough vitamin and hormone naturally for the roots and that watering with an ounce of stock solution to three quarts of water will improve turf quality. Sods similarly treated before being set in place will also readily form new roots. (*Science and Culture* 6: 219.)

Indication of a New Chick Growth Factor in Rice. Hogan and his co-workers (*Jour. Biol. Chem.*, 64, 113, 1925) suggested that polished rice contains a chick growth factor not present in any significant amount in yeast. MacFarlane *et al* (*Jour. Nutrition*, 4, 331, 1931) supported this observation. Stokstad and Manning (*Poultry Science*, 18, 413, 1939) studied this problem and found that polished rice has a growth-promoting effect which cannot be provided by levels of dried yeast up to 15 per cent of the ration. Very recently Almquist, Stokstad, Mecchi and Manning (*Jour. Biol. Chem.*, 134, 213, 1940) have found that glycine is required in the diet for optimum growth of the chick. When adequate glycine is present in the diet chondroitin has a growth-promoting action on the chick. A combined effect of glycine and chondroitin can replace the "rice factor".

(*Science and Culture*, 6: 239.)

Correspondence.

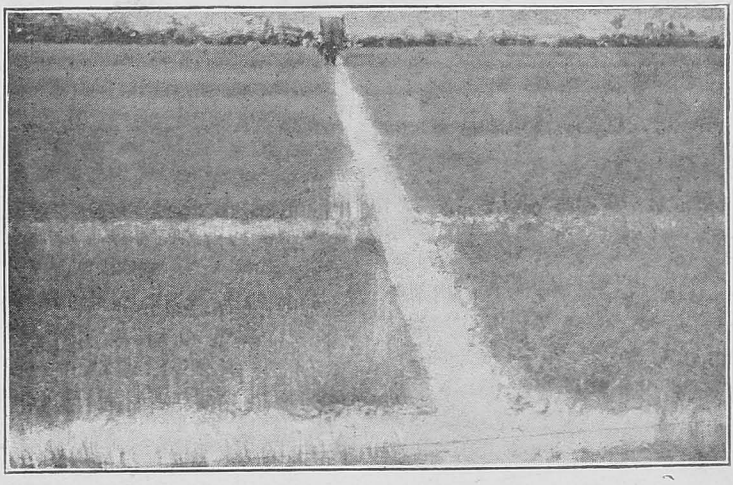
To The Editor, Madras Agricultural Journal.

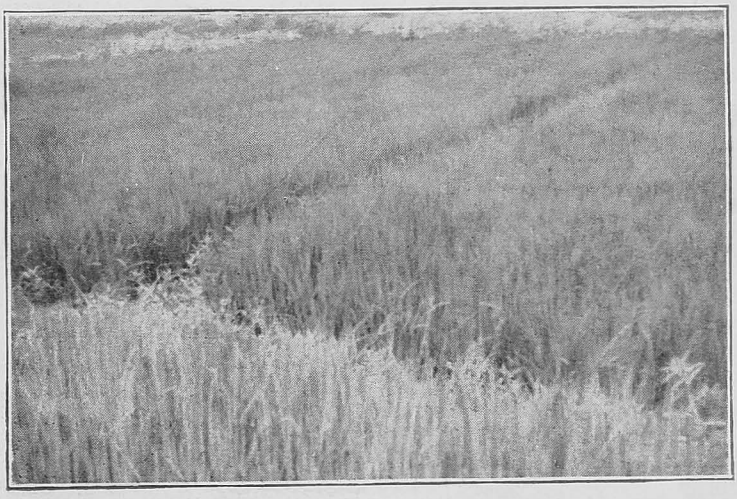
One-cent paddy nurseries.

Sir,

I enclose two photographs of one cent paddy nurseries the value of which has been demonstrated to ryots and which was a feature of the landscape on the main bus route in the Mayavaram to Tiruvarur Road between June and September 1940. These are representative of the 4574 one cent nursery plots laid in 56·76 acres of nursery raised during the period.

After the last ploughing the nursery fields were levelled by a levelling board drawn by a pair of bullocks, the fields marked out into plots of 8 feet breadth and 54 feet length with channels one and half feet wide all round The plots thus marked out were again levelled with a hand levelling board, the coolies

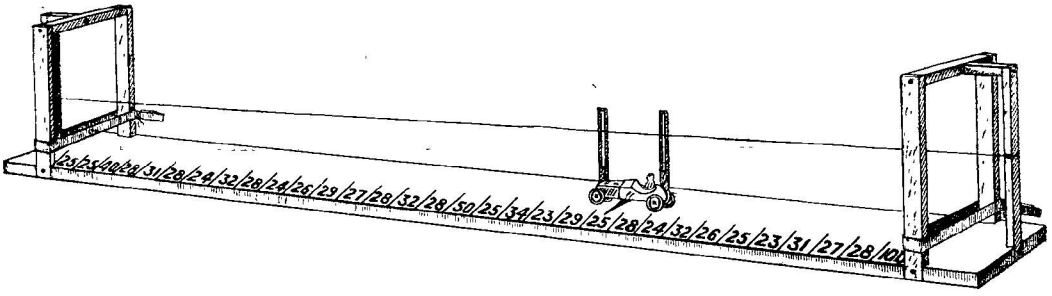




ONE-CENT PADDY NURSERIES

Top. A view of adjacent plots showing the channels on all sides.

Bottom. Another view showing the uniformly grown seedlings ready for transplanting.



A novel device for pushing sale of Groundnuts.

working from the intervening channels. Water was then let in to about an inch depth and allowed to stagnate in the beds for a few hours. The sprouted seed was then measured out at 1 Madras measure per plot for *samba*, 1½ M. M.* for *Kuruvai* and 2 M. M. for *Udukuruvai* and handed over to the sowing coolies who went round the plot twice or thrice along the intervening channels scattering the seeds uniformly.

This method of sowing ensured uniform and good germination of seeds and uniform growth of seedlings as there was good drainage. The method also prevented the formation of foot print pockets caused by labourers walking over the beds which is unavoidable in the local method. The seedlings were transplanted in singles 4 inches apart in *Kuruvai* and 4 to 5 inches apart in *Samba*. The Kuruvai yields have given an average increased yield of about 10% over the bunch planting apart from a saving of 50 per cent. in seed.

Agricultural Demonstrator's Office,
Mayavaram.

Yours etc.,
M. J. David.

To The Editor, Madras Agricultural Journal.

A Novel device for pushing sale of Groundnuts.

Sir,

Groundnut has long been recognised as a very palatable and cheap "nut" though people seldom realised its high nutritive value. Roasted groundnuts are often sold exposed in shallow bamboo trays at street corners or in the vicinity of toddy shops, in most of the towns, by old women, but are patronised only by labourers or poorer class of people chiefly because they are sold under dirty conditions, or in uninviting surroundings. Other people go in for this tasty and cheap "munch" only at places of public resort, like parks, sea-beach, or theatres when it is sold by decent-looking mobile vendors. A new method of selling groundnuts now prevalent in the West Coast towns and which has come to my notice recently, is described below with the hope that it would be of interest to others particularly at this time when much is talked about the restriction of area under groundnuts and stimulation of internal consumption to meet the situation brought about by the closure of foreign markets and the consequent lack of export trade.

The new device is an adaptation of a contrivance for a game of chance to the sale of groundnuts, which easily provokes the crowd that gathers round it to try their luck. It consists of a wooden plank about 4½ feet long and 6 inches broad, one edge of which is divided into a number of small spaces each marked with a number in the following order, viz., 25, 25, 40, 28, 31, 28, 24, 32, 28, 24, 26, 29, 27, 28, 32, 28, 50, 25, 34, 23, 29, 25, 28, 24, 32, 26, 25, 23, 31, 27, 28, 100. (Vide illustration). Over this plank a small toy car is flicked, the movement being confined to a straight path by providing at each end of the car, a vertical metal piece having a longitudinal slit through which passes a galvanised wire. The wire is drawn tight and fixed to two vertical struts at the two extreme ends of the plank. Three inches from each end two more struts are fixed and a narrow strip of rubber is tightly tied round them to act as springs for throwing back the toy car when it is flicked backwards or forwards. The toy car is provided with a pointer towards the side of the plank on which the numbers have been marked. The set is made locally and costs only about a rupee.

On receipt of the token money which is only a pie in this case, the vendor—generally a boy—who sits on the road side with a bag of roasted groundnut pods gives a flick to the toy car. The car moves forward, strikes against the strip of rubber, recoils back and finally comes to rest, its pointer standing over some

* M. M. means Madras measure=3 lb.

number painted on the plank. This number of roasted groundnuts is then counted out to the man who has had his chance. The idea of trial of luck being contagious spreads through the whole crowd that gathers round this novel contrivance. The vendor by this simple method is able to drive a brisk sale up to about Rs. 1/8 to Rs. 3 a day and earn a profit of annas two for every rupee worth of groundnut sold. In a small panchayat like Pattambi in South Malabar about half a dozen such sales-boys are said to operate during the season. It has also been gathered that this method of selling groundnuts is prevalent in many other small towns in the West Coast and has spread even to the States of Cochin and Travancore. The method proves attractive and may be introduced elsewhere as well.

Agricultural Research Institute,
Lawley Road, P. O., Coimbatore,
Dated the 8th November 1940.

Yours &c.

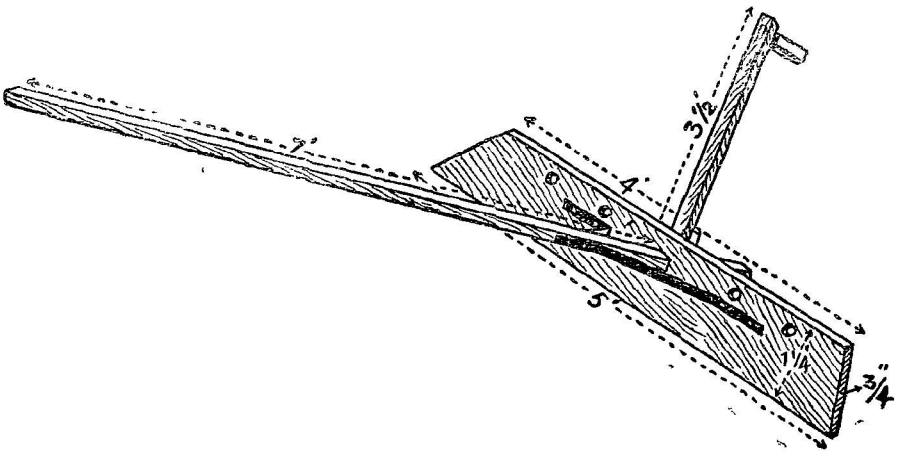
C. M. John.

To The Editor, Madras Agricultural Journal.

A newly designed bullock-drawn levelling-board.

Sir,

In wet lands levelling is usually done for paddy nurseries to get good, even germination of paddy seeds. It is not generally done for transplant fields. It is specially so in Tanjore Delta and in all other districts where irrigation water is supplied to wet lands from big projects. Wherever there is a plentiful supply of irrigation water, ryots do not bother about levelling wet lands. Even if land should be uneven from one end to the other, they can let in water in plenty to reach the other end. But the case is different with dry districts like Salem, North Arcot etc., where water is baled out from deep wells to raise paddy crops. Ryots in these districts have necessarily to keep their land perfectly level so that they can easily, quickly and economically irrigate their crops. The levelling of wet land further helps even growth of plants, even flowering and maturing of grains, which must result in greater yield. For securing such levelling in wet land, a new levelling board was designed to be worked by cattle.



The implement (see illustration) consists of an ordinary level plank 5 feet long at the bottom, 4 feet at the top, 1¼ feet deep, and ½ to ⅝ inch thick, to which a shaft-pole 7 feet long is fitted about 3 inches from the top edge and at right angles to the plank at the centre. The two long edges of the plank are made straight and even. It is provided also with a wooden handle about 3½ feet in height. The shaft-pole passes through the plank and through the handle at the back and firmly secured behind by a wooden peg. Two iron brackets are

provided binding the shaft-pole to the plank in order to give steadiness and even pull to the levelling board. Four holes about 1½ inches in diameter are symmetrically made on both sides of the plank about 3 to 4 inches from the top edge. This is to provide an outlet for excess water that may be collecting over the puddle when the implement is working as there is no need to drag the water also. It will give some relief to the cattle by lessening the strain.

The implement is to be worked in wet lands as the last operation before planting paddy and when the field is in a well-puddled condition. Wherever there is uneven ground which can be easily spotted out by having 1 to 2 inches of water all over the field, the implement is lightly pressed by the handle when it is working. The excess puddle will collect in front and is carried forward and where there is depression the implement is lifted by the handle gently and gradually and the mud will be dropped evenly in the depression as the implement moves. Where the land is already level the implement is allowed to move on without any strain on the handle. One pair of animals can easily cover upto 2 to 3 acres in half day according to the amount of levelling to be done.

If the levelling board is worked every year one can easily dispense with an annual operation in wet land which is called *Kulivettu* over which large sums of money are spent at least once in four or five years over the same piece of land. If the soil should be sandy or very sandy loam it is better the levelling is done with the implement previous to the last ploughing and planting. The idea is such soils may be hardened and it may prevent young roots from easily taking root and the succeeding ploughing will rectify and loosen the soil. This levelling board was tried by several ryots and found to do excellent work. There are now 30 to 40 of them working successfully in Shiyali Taluk.

Agricultural Demonstrator's Office
Shiyali 6—11—40.

Yours etc.
M. Gopala Chetty.

Coffee Control Scheme.

We publish below a Press Note issued by the Government of Madras regarding the Coffee Control Scheme. Ed. M. A. J.

The coffee industry which is concentrated in Madras, Coorg, Mysore, Travancore and Cochin has lost a considerable proportion of its export market as a result of the war. At a meeting of the representatives of all coffee interests, held at Madras in September last, which was attended by the representatives of the Governments and States concerned and the Hon'ble the Commerce Member of the Government of India, an agreed scheme for dealing with the situation was arrived at.

The Central Government have decided to introduce that scheme, as an experimental measure, for the season 1940—41. The Coffee Market Expansion Ordinance, 1940, has been promulgated to give effect to that decision. It comes into effect from December 21, 1940. Sub-section 2 (1) of Section 14 of the Ordinance requires every person owning land planted with coffee plants aggregating not less than 25 acres, whether such land is comprised in one estate or in more than one estate and whether it is wholly or only partly in British India, to apply to the registering officer appointed in this behalf by the Provincial Government to be registered as an owner and in respect of each estate owned by him. Such application has to be made before the expiration of one month from 21st December 1940, the date of commencement of the Ordinance or before the expiration of one month from the date on which after the commencement of the Ordinance he becomes subject to the provisions of sub-section (1) of Section 14 of the Ordinance. The Ordinance empowers the Provincial Government to appoint the registering officer.

The Government have accordingly appointed the Collectors of districts in which the estates are situated as the registering officers in this Province. Every owner of a coffee estate to whom the Ordinance applies should apply for registration to the Collector of the district in which his estate or one of his estates is situated within the time limit prescribed in the Ordinance.

Crop and Trade Reports.

Statistics—Cotton—1940-41—Third forecast report. The average of the areas under cotton in the Madras Province during the five years ending 1938—39 has represented 9·7 per cent of the total area under cotton in India.

2. The area under cotton up to 25th November 1940 is estimated at 1,874 300 acres. When compared with the area of 1,780,300 acres estimated for the corresponding period of last year it reveals an increase of 5·3 per cent.

The area is the same as that of last year in Tanjore and South Kanara. A decrease in area is revealed in Vizagapatam, West Godavari, Kurnool, Nellore South Arcot, North Arcot, Ramnad and Tinnevelly and an increase in area in the other districts of the Province. The variations are marked in Kurnool (−34,000 acres), Bellary (+25,000 acres), Coimbatore (+69,300 acres), Madura (+32,500 acres), Ramnad (−22 200 acres) and Tinnevelly (−17,500 acres).

The area under irrigated cotton, mainly Cambodia, is estimated at 226,300 acres as against 153,800 acres in the corresponding period of last year, thereby representing an increase of 47·1 per cent.

3. Pickings of the *mungari* or early sown crop in parts of the Deccan are in progress and the yield is expected to be slightly below normal.

Normal yields are expected in all the districts outside Tinnevelly. The seasonal factor for the Province as a whole works out to 99 per cent of the average as against 100 per cent in the corresponding period in the previous year. On this basis, the total yield is estimated as 410,400 bales of 400 lb. lint as against 366,800 bales of last year, thereby representing an increase of 11·9 per cent. The crop is young and it is too early to estimate the yield with accuracy.

The estimated area and yield according to varieties are given below:—

(Area in hundreds of acres, i. e., 00 being omitted; yield in hundreds of bales of 400 lb. lint, i. e., 00 being omitted.)

Variety.	Area from 1st April to 25th November		Corresponding yield.	
	1940	1939	1940	1939
1	2	3	4	5
	Acres.	Acres.	Bales.	Bales.
Irrigated Cambodia	212,6	142,8	132,5	89,2
Dry Cambodia	214,7	157 8	46,0	33,6
Total cambodia ...	427,3	300,6	178,5	122,8
Uppam in the Central Districts ...	12,3	20,0	1,9	3,9
Nadam and Bourbon	29,8	22,1	1,5	1,2
Total, Salems ...	42,1	42.1	3,4	5,1
Tinnevellies*	382.7	429,0	94,0	107,3
White and red Northerns	150,0	167,0	18,8	20,9
Westerns	762,0	744,0	95,3	93,0
Warangal and Cocanadas	102 7	90,1	19,5	16,8
Chinnapathi (short staple)	7,5	7,5	9	9

* Includes Karunganni in Coimbatore and Uppam, Karunganni and mixed country cotton in Madura, Ramnad and Tinnevelly.

The local cotton trade is not generally active at this time of the year. The average wholesale price of cotton lint per imperial maund of 82⅔ lbs. as reported from important markets on 2nd December 1940 was about Rs. 16—7—0 for Cocanadas, Rs. 18—6—0 for White Northerns, Rs. 18-7-0 for Red Northerns, Rs. 15-6-0 for Westerns (*mungari* crop), Rs. 18—13—0 for Westerns (*jowari* crop), Rs. 30-15-0 for Coimbatore Cambodia, Rs. 26—8—0 for Southern Cambodia, Rs. 28—8—0 for Coimbatore Karunganni, Rs. 24—7—0 for Tinnevelly Karunganni, Rs. 23—15—0 for Tinnevellies and Rs 22—14—0 for Nadam cotton. When compared with the prices published in the last report, i. e., those which prevailed on 4th November 1940, these prices reveal a rise of about 12 per cent. in the case of Southern Cambodia, 7 per cent. in the case of Tinnevellies, 6 per cent. in the case of White Northerns, Coimbatore Cambodia and Tinnevelly Karunganni, 5 per cent. in the case of Cocanadas, 3 per cent. in the case of Westerns (*mungari*) and 2 per cent in the case of Red Northerns, the prices remaining more or less stationary in the case of Westerns (*jowari*), Coimbatore Karunganni and Nadam.

(From the Director of Industries and Commerce.)

Statistics—Crop—Cotton—1940-41—Intermediate condition report. Pickings of the Mungari or early sown crop in parts of the Deccan are nearing completion and the yield is expected to be slightly below normal. In Coimbatore, Madura, Ramnad and Tinnevelly, the growth of the young plants is reported to have been affected to some extent by the heavy and continuous rains of November. The condition of the crop is generally satisfactory elsewhere in the Province.

The average wholesale price of cotton lint per imperial maund of 82⅔ lb (equivalent to 3,200 tolas) as reported from important markets on 6th January 1941 was Rs. 14—0—0 for Cocanadas, Rs. 16—12—0 for white Northerns, Rs. 16-7-0 for red Northerns, Rs. 12—14—0 for Westerns (Mungari crop), Rs. 17—12—0 for Westerns (Jowari crop), Rs. 30—13—0 for Coimbatore Combodia, Rs. 27—8—0 for Coimbatore Karunganni, Rs. 24—2—0 for Tinnevelly Karunganni, Rs. 20—13—0 for Tinnevellies and Rs. 21—13—0 for Nadam cotton. When compared with the prices published in the last report i. e., those which prevailed on 2nd December 1940, these prices reveal a fall of approximately 16 per cent in the case of Westerns (Mungari crop), 15 per cent in the case of Cocanadas, 13 per cent in the case of Tinnevellies, 11 per cent in the case of red Northerns, nine per cent in the case of white northerns, six per cent in the case of Western (Jowari crop), five per cent in the case of Nadam, four per cent in the case of Coimbatore Karunganni and one per cent in the case of Tinnevelly Karunganni, the price remaining practically stationary in the case of Coimbatore Cambodia.

(From the Director of Industries and Commerce).

Statistics—Crop—Groundnut—1940—Fourth or final report. The average of the areas under groundnut in the Madras Province during the five years ending 1938—39 has represented 48·6 per cent of the total area under groundnut in India.

The area sown with groundnut in the Province in 1940 is estimated at 3.820,000 acres. When compared with the corresponding estimate of 3,534,200 acres for the previous year and the actual area of 3,617,600 acres according to the Season and Crop Report of the previous year, the present estimate reveals an increase of 8·1 per cent and 5·6 per cent respectively. The estimated area for this year exceeds the average area of 3,415,210 acres by 11·9 per cent.

The increase in area is general outside Vizagapatam, East Godavari, Kistna (−25,300 acres), Guntur (−28,800 acres), Cuddapah, Nellore, South Arcot (−25,100 acres), North Arcot, Tanjore and Ramnad and is marked in Kurnool (−69,800 acres), Bellary (+73,500 acres) Anantapur (+45,200 acres), Salem (+38,400 acres) and Coimbatore (+39,600 acres). The area in the Deccan rose from 1,226,300 acres in 1939—40 to 1,405,000 acres in the current year i. e., by 14·6 per cent.

The harvesting of the summer and early crop of groundnut had concluded by the end of October. The harvesting of the winter or main crop is proceeding.

The crop was affected to some extent by drought in Anantapur, Chittoor, North Arcot and Salem, by heavy rains in Nellore, South Arcot, Trichinopoly, Tanjore and Madura, and by insect pests in parts of Trichinopoly, Tanjore and Madura. The yield is expected to be above normal in Bellary, normal in East Godavari, West Godavari, Kistna and Guntur, Kurnool and Ramnad and below normal in the other districts. The yield is estimated to be low in South Arcot (70 per cent), North Arcot (75 per cent), Chingleput and Tanjore (77 per cent in each). The seasonal factor for the Province as a whole works out to 92 per cent of the average as against 95 per cent in the previous year according to the Season and Crop Report. On this basis, the yield is expected to be 1,760,800 tons of unshelled nuts as against 1,702,680 tons in the previous year, an increase of 3·4 per cent. The yield in an average year is estimated at 1,707,550 tons.

The wholesale price of groundnut (shelled) per imperial maund of 82⅔ lb. (equivalent to 3,200 tolas) as reported from important market centres on 6th January 1941 was Rs. 3—7—0 in Tadpatri, Rs. 3—3—0 in Coimbatore, Rs. 3—2—0 in Vizagapatam, Guntur and Hindupur, Rs. 3—0—0 in Vizianagaram and Cuddalore, Rs. 2—13—0 in Salem, Rs. 2—11—0 in Cuddapah and Vellore, Rs. 2—10—0 in Adoni and Bellary, Rs. 2—8—0 in Nandyal and Rs. 2—7—0 in Guntakal. When compared with the prices published in the last report, i. e., those which prevailed on 4th November 1940, these prices reveal a fall of approximately 27 per cent in Nandyal, 22 per cent in Vellore and Guntakal, 20 per cent in Cuddapah, 18 per cent in Adoni and Bellary, 14 per cent in Vizagapatam, Vizianagaram, Guntur and Cuddalore, 12 per cent in Hindupur, 10 per cent in Salem, eight per cent in Tadpatri and four per cent in Coimbatore.

(From the Director of Industries and Commerce).

Statistics—Crop—Castor—1940—First or final report. The average of the areas under castor in the Madras Province during the five years ending 1938-39 has represented 17·5 per cent of the total area under castor in India.

The area under castor in the Madras Province up to 25th November 1940 is estimated at 2,50 000 acres. When compared with the area of 272,600 acres estimated during the corresponding period of last year, it reveals a decrease of 8·3 per cent. The estimate of last year was greater than the actual area of 266,051 acres by 2·5 per cent.

The crop is mainly grown in Guntur (27,000 acres), the Deccan (121,000 acres), Nellore (38,000 acres) and Salem. As compared with the actual area of last year, a decrease in area is estimated in Guntur, Anantapur (–21,200 acres), and Nellore and an increase in area in the other districts.

The yield is expected to be normal in all districts outside Vizagapatam. The seasonal factor for the Province as a whole is estimated to be 100 per cent of the normal. On this basis, the yield is estimated at 24,900 tons as against 26,800 tons estimated for the corresponding period of last year and 25,630 tons estimated in the season and crop report of last year.

The wholesale price of castor seed per imperial maund of 82⅔ lb. (equivalent to 3,200 tolas) as reported from important markets on 16th December 1940 was Rs. 6—4—0 in Vizianagaram, Rs. 6—0—0 in Guntur, Rs. 5—15—0 in Nandyal, Rs. 5—12—0 in Vizagapatam, Rs. 5—8—0 in Cuddapah, Rs. 5—0—0 in Bellary and Anantapur and Rs. 4—10—0 in Hindupur. When compared with the prices reported in the previous year, i. e., those which prevailed on 18th December 1939, these prices reveal a rise of approximately 14 per cent in Vizianagaram, 11 per cent in Anantapur, and ten per cent in Cuddapah and a fall of approximately 14 per cent in Nandyal and nine per cent in Bellary, the price remaining stationary in Hindupur. *(From the Director of Industries and Commerce.)*

Subject:— Statistics—Ginger—1940—Final Report. The area under ginger in 1940 is estimated at 12,000 acres in Malabar and 800 acres in South Kanara as against the actual area of 11,112 acres in Malabar and 800 acres in South Kanara in the previous year.

The condition of the crop is generally satisfactory except in parts of Malabar where the crop is affected by "soft-rot" to some extent. The seasonal factor is estimated at 95 per cent of the normal in Malabar and 100 per cent in South Kanara. On this basis, the yield is estimated at 4,360 tons of dry ginger (4,070 tons in Malabar and 290 tons in South Canara) as against 4290 tons the previous year (4,040 tons in Malabar and 250 tons in South Kanara),

(From the Director of Industries and Commerce).

Statistics—Paddy—1940—41—Intermediate condition report. The main crop of paddy has been or is being harvested in parts of the Circars, the Deccan and the central districts. The yield is reported to be below normal in Vizagapatam and Chittoor: normal in the other districts.

The crop has been affected to some extent by disease in parts of Guntur, by insect pests in parts of Chingleput, North Arcot and Tanjore and by heavy rains in Tanjore. The condiition of the crop is generally satisfactory in the other districts.

The wholesale price of paddy, second sort, per imperial maund of 82⅔ lb. (equivalent to 3,200 tolas) as reported from important markets on 6th January 1941 was Rs. 3—8—0 in Madura, Rs. 3—2—0 in Rajahmundry, Ellore, Bezwada, Guntur and Virudhunagar, Rs. 3—1—0 in Cocanada, Masulipatam and Trichinopoly, Rs. 3—0—0 in Vizianagaram and Tinnevelly, Rs. 2—15—0 in Kumbakonam, Rs. 2—14—0 in Hindupur and Chittoor, Rs. 2—13—0 in Nagapatam, Rs. 2—12—0 in Vellore and Anantapur, Rs. 2—7—0 in Cuddalore and Rs. 2—1—0 in Canjeevaram. When compared with the prices published in the last report, i. e, those which prevailed on 9th December 1940, these prices reveal a rise of approximately 19 per cent in Anantapur and two per cent in Kumbakonam and a fall of approximately 18 per cent in Masulipatam, 12 per cent in Ellore and Vellore, 11 per cent in Cocanada, Rajahmundry, Bezwada and Guntur eight per cent in Trichinopoly, six per cent in Tinnevelly, five per cent in Cuddalore and four per cent in Chittoor, the prices remaining stationary in Vizianagaram, Hindupur, Conjeevaram, Nagapatam, Madura and Virudhunagar.

(From the Director of Industries and Commerce.)

Statistics—Pepper—1940—Final Report. The area under pepper in 1940 in Malabar and South Kanara is estimated at 104,000 acres (95,200 acres in Malabar and 8,000 acres in South Kanara) as against the final area of 104,384 acres (95,599 acres in Malabar and 8,795 acres in South Kanara) in the previous year.

The condition of the crop is generally satisfactory. The seasonal factor is estimated at 100 per cent as against 105 per cent in the previous year. On this basis, the yield is estimated at 9,990 tons (9,140 tons in Malabar and 870 tons in South Kanara) estimated in the previous year.

The wholesale price of pepper per imperial maund of 82⅔ lb. (equivalent to 3,200 tolas as reported from important markets on 6th January 1941 was Rs. 9—14—0 in Calicut. Rs. 9—2—0 in Tellicherry and Rs. 10—2—0 in Mangalore. When compared with the prices published in the last report, i. e., those which prevailed on 9th September 1940, these prices reveal a fall of approximately 12 per cent at Calicut and seven per cent at Tellicherry the price remaining stationary at Mangalore. *(From the Director of Industries and Commerce.)*

Statistics—Crop—Gingelly—1940-41—Third Report. The average of the areas under gingelly in the Madras Province during the five years ending 1938-39 has represented 16·2 per cent of the total area under gingelly in India.

The area sown with gingelly up to 25th December 1940 is estimated at 558,300 acres. When compared with the area of 601,960 acres estimated for the corresponding period of last year, it reveals a decrease of 7·2 per cent. The area estimated for Coimbatore is the highest reported in recent years.

The estimated area is the same as that of last year in West Godavari, Cuddapah and Malabar. An increase in area is estimated in Vizagapatam, East Godavari (plus 13,000 acres), Kurnool, Coimbatore, Trichinopoly and Tinnevelly and a decrease in area in the other districts of the Province, especially in Anantapur (– 13,000 acres), Chingleput (– 14,000 acres) and Salem (– 28,000 acres) owing to want of timely sowing rains.

The main crop has been harvested except in the South. The yield is estimated to be above normal in Kurnool, normal in Vizagapattam, East Godavari, Guntur, Cuddapah, Nellore, Salem, Coimbatore, Ramnad and South Kanara and below normal in the other districts, especially in South Arcot (70 per cent) in Chingleput and Tinnevelly (75 per cent in each).

The seasonal factor for the Province as a whole works out to 94 per cent of the average as against 87 per cent for the corresponding period of last year. On this basis, the yield is estimated at 70,700 tons as against 69,400 tons for the corresponding period of last year, an increase of 1 9 per cent.

The wholesale price of gingelly per imperial maund of 82$\frac{2}{7}$ lb. (equivalent to 3,200 tolas) as reported from important markets on 6th January 1941 was Rs. 6—12—0 in Tinnevelly, Rs. 6—8—0 in Cocanada, Rs. 6—7—0 in Cuddalore, Rs. 6– 6—0 in Trichinopoly, Rs. 6—5—0 in Tuticorin, Rs. 6-1-0 in Rajamundry, Rs. 6-0-0 in Vizianagaram, Rs. 5-12-0 in Salem, Rs. 5-8-0 in Vizagapatam, and Rs 5-3-0 in Ellore. When compared with the prices published in the last report, i. e., those which prevailed on 4th November 1940, these prices reveal a rise of approximately 15 per cent in Tuticorin 13 per cent in Cocanada and 7 per cent in Rajamundry and fall of approximately 13 per cent in Ellore, 4 per cent in Vizagapatam, Vizianagaram and Tinnevelly and 3 per cent in Trichinopoly, the prices remaining stationary in Cuddalore and Salem.

(*From the Director of Industries and Commerce.*)

College News and Notes.

Students' Corner :—Students' Club. Under the auspices of the Students' Club Rao Bahadur T. S. Venkataraman, Sugarcane Expert, Imperial Sugarcane Research Station, delivered an inspiring lecture on 23—1—41 on Indian Village and our duty to it, Sri. N. Lakshmanan occupied the chair. The speaker dealt exhaustively on the out-standing problems confronting the present village folk. Recounting some of his personal experiences of the failure of agriculture as a profession the speaker stated that even the best practices of the West should be modified to suit the Indian conditions, if they are to be useful.

On 24—1—41 Mr. A. J. Macdonald, B. Sc., B. Sc. (Agri.) N. D. A., Officer in charge, Poultry Research Section, Imperial Veterinary Research Institute, Izatnagar delivered an educative and thought-provoking lecture on 'Poultry Farming' in India with Sri. K. Unnikrishna Menon in the chair. The speaker deplored the lack of statistics relating to the Poultry Industry in India and gave a short account of the various aspects of poultry work at Izatnagar and the possible lines of development of the Indian Poultry Industry.

College. The College reopened after the Christmas and New year holidays on the 4th January '41. The students of class II proceeded on an educational tour of the Southern districts of the province.

Selection for University Examination. Five students in the first year and one in second year classes were detained from appearance in the University examinations on the score of their unsatisfactory progress revealed in the terminal examinations.

Educational Tour. Starting from Coimbatore on the 3rd of January the second year class reached Tindivanam on the 4th night. The cultivation of oil seed crops and their marketing were the chief subjects of study at this centre. Reaching Palur on the 7th they made studies regarding the cultivation of sugarcane, paddy, groundnut, ragi etc. On the 10th the party visited the sugar factory belonging to Messrs. East India Distilleries and Sugar Factories Ltd. at Nellikuppam. They were shown round the distillery, sugar factory and the confectionery. The party halted at Chidambaram and visited the Annamalai University Colonisation lands. The progress of the much-discussed Colonisation scheme and the enterprise of the graduate Colonists was a matter of great interest to a batch of agricultural graduates in the making. The same night they reached Agricultural Research Station, Aduthurai and in the course of their stay of two days, made a study of the cultivation of paddy, sugarcane, plantains etc. Next day by noon the party paid a visit to a model farm run by Rao Sahib N. S Kolandaiswami Pillai, retired Deputy Director of Agriculture, Trichinopoly. That evening they went to a village and held enquiries about the cultivation of plantains and turmeric. Some of the students took advantage of the proximity of the famous shrine at Srirangam to pay a visit to the place. The 14th day of January dawned on the gay and happy students in Koilpatti. Koilpatti afforded the students scope for the study of the cultivation of cotton, cumbu, cholam, thenai etc., and the opportunity was availed to make some rural enquiries. On the 16th morning the party left the place and reached the great and humming city of Madura by noon where a visit was arranged to the Municipal sewage farm. The glorious sight of the holy Meenakshi Temple and the Thirumalainayakan palace, made a great impression on the young minds. The party returned to Coimbatore on the 17th afternoon.

The students played a badminton match at Tindivanam and lost in a keen contest. At Koilpatti they played a volley ball match against the local high school team and had an easy victory. The party was led by Sri. K. Unnikrishna Menon, Senior Lecturer in Agriculture and Sri. P. A. Venkateswaran, Senior Teaching Assistant.

Games:— Football. In the inter-tutorial foot-ball match played in connection with the club day activities Mr. K. M. Thomas' wards defeated Mr. P. V. Ramiah's wards by 3 goals to 1 and Sri. C. R. Srinivasa Ayyangar's wards won over Sri. C. N. Narasimha Ayyangar's by 2 to 1.

Hockey. In the inter-class tournament played for the Victory cup the match between 1st and 3rd year classes ended in a draw on the first day, but in the replay the third year class defeated their enthusiastic juniors by 4 goals to 1.

New Year Honours It is gratifying to note that the title of K. C. S. I. was awarded to Sir. C. P. Ramaswami Ayyar, Dewan of Travancore and a Patron of the Madras Agricultural Students' Union and that the title of Rao Bahadur was conferred on Sri. K. T. Alwa, Headquarters Deputy Director of Agriculture, Madras. We offer our congratulations to these friends of the Union on their well-merited distinctions.

Visitors. Mr. P. H. Rama Reddy, Director of Agriculture, Madras, Mr. T. J. Hurley, Director of Veterinary Services, Madras, Mr. M. J. Narasimham, Deputy Director of Agriculture, Mysore state, Mr. J. B. Polding Esq., Research Officer on contagious abortion, Imperial Veterinary Institute, Mukteswar, and Mr. M. J. Macdonald, Officer in charge, Poultry Research section, Imperial Veterinary Institute, Izatnagar, were among the visitors to the Agricultural College and Research Institute during the month.

Association of Economic Biologists, Coimbatore. At a meeting of the association held on the 20th December 1940, Rao Bahadur M. R. Ramaswami Sivan, Retired Principal, Agricultural College gave a lecture on 'The Anand Institute'. This was followed by a paper by Rao Bahadur G. N. Rangaswami Ayyangar and V. Achuta Wariar on "The little Millet, *Pancum miliare.*"

First aid Training. The training class for the benefit of the College Estate residents under the auspices of the St. John's Ambulance Association was inaugurated on the 22nd January 1941. The first class was held on the 26th January at which over fifty residents of the estate attended. We are grateful to the Coimbatore branch of the Ambulance Association and Dr. P. R. Kuppuswami for arranging the classes to be held at the College.

New Year's Day War Victory Celebration. The Agricultural College and Research Institute Estate celebrated New Year's Day in three meetings held in three different places—north, centre and south of the Estate area. Meetings were held at the Millets Breeding Station (North), the Central Farm (Centre), and the Paddy Breeding Station (South). All the labourers were assembled along with the yillagers of the surrounding hamlets. After due publicity large gatherings were held, and the success over the Italians was explained to them. They were given an insight into the harrowing conditions of the War areas and of the peace and security enjoyed by us, under the protection of the strong arm of Britain. The villagers were made to realise the necessity for making liberal contributions towards this War effort. At the end of the meetings, sweets were distributed to the children,

OBITUARY

We regret to record the sad demise of Sri. P. Parthasarathy, B. Sc. Ag. on the night of 25th December at the early age of 33 He passed out of the Agricultural College, Coimbatore in 1933 and joined the Department first at Kodur. In recognition of his experience in fruit research work he was recently posted to Guntur for developing the newly started orchard at this place. He took ill recently and passed away in spite of the best medical help. He was a capable and enthusiastic young man and in his death the Department loses a very promising officer. He leaves behind him his young widow, aged mother, several relations and a host of friends to bemoan his loss.

Moffussil News.

Agricultural Exhibition at Tiruvannamalai. An Exhibition stall was opened in the Fourth All India Swadeshi Exhibition held at Tiruvannamalai, on the occasion of the *Karthigai Deepam* Festival, from the 5th to the 16th. The Exhibition Committee afforded all facilities for arranging the stall. The exhibits were arranged into eight sections, comprising of seeds and crops, implements, manure preservation, horticulture, cream jaggery making, malt making, insect pests and diseases and bee-keeping. The exhibits in each section were arranged tastefully and supplemented with coloured pictorial and word posters. The Coimbatore strains of paddy and the ground-nut specimens of seeds and plants from Tindivanam Research station elicited many inquiries. The horticultural exhibits included fruit plants from Kodur, fruit research station, fruits from Coonoor, posters illustrating care and management of citrus gardens and preserves which demonstrated the possibility of the utilisation of surplus fruit. Considerable interest was evinced in all these exhibits. Malt making which was demonstrated as a practicable cottage industry was appreciated by many visitors. The section dealing with insect pests and diseases with control measures elicited nearly 64

inquiries from persons coming from different districts. Bee-keeping exhibits effectively kept a crowd of interested people always about them. Honey and wax produced from the Haji Apiaries, Vaniambadi, were sold during the period and there was a large demand for more honey.

The Exhibition was opened by the Revenue Divisional Officer, Tiruvannamalai, Sri. M. P. Narayanan Nair. The committee of judges awarded a Gold medal certificate to the Department. A. R.

Denkanikottai Rural Exhibition. A Rural Agricultural Exhibition was organised under the auspices of the Village Uplift Sangham, Denkanikottai, Hosur taluk, Salem. The Exhibition attracted considerable interest from all the surrounding villages. There was keen competition amongst the exhibitors for the prizes. Besides exhibits kept in the stall crops were judged in situ in the fields. The Department exhibited improved strains of seeds and iron implements for various agricultural operations suited to the locality. The exhibits were judged by the Sub-Collector, Hosur and prizes in the form of Seeds, Implements and Manures were awarded to the best exhibits. A. R.

Weather Review—DECEMBER 1940.

RAINFALL DATA

Division	Station.	Actual for month	Departure from normal @	Total since January 1st	Division	Station	Actual for month	Departure from normal @	Total since January 1st
Circars	Gopalpore	0·0	−0·7	72·1	South	Negapatam	18·1	+6·7	76·3
	Calingapatam	0·0	−0·7	45·9		Aduthurai *	5 6	−2·5	50·3
	Vizagapatam	0·7	0·0	34·6		Madura	1·9	+0·1	44·6
	Anakapalli*	0·0	0·0	0·0		Pamban	4·1	−3·4	48·4
	Samalkota*					Koilpatti*	5·8	+3·1	44·2
	Maruteru*	0·0	−0·3	40·6		Palamkottah	7·9	+3·9	33·7
	Cocanada	0·0	−0·9	46·0					
	Masulipatam	0·2	−0·7	41·2					
	Guntur*	1·1	+0 2	34·3	West Coast	Trivandrum	5·2	0·0	71·8
						Cochin	2·7	+1·0	132·1
Ceded Dists.	Kurnool	0·0	−0·2	29·1		Calicut	0·0	−1·1	128·8
	Nandyal*	1·4	+1·3	24·3		Pattambi *	1·0	+0·2	99·0
	Hagari *	0·2	+0·1	22·0		Taliparamba *	0·2	−0·5	149·1
	Siruguppa*	0·1	0·0	24·5		Kasargode *	0·7	−0·1	152·5
	Bellary	0·1	0·0	22·1		Nileshwar*	0·5	−0·2	157·3
	Anantapur	0·0	−0·3	27·3		Mangalore	0·6	+0·1	150·3
	Rentachintala	0·7		27·4					
	Cuddapah	0·0	−0·9	39 9					
	Anantharaju-pet *	0 9	−0 7	50·4	Mysore and Coorg	Chitaldrug	0·1	−0·2	34·0
						Bangalore	0·6	+0·1	36·5
Carnatic	Nellore	1·6	−1·6	55·2		Mysore	0·9	+0·5	48·4
	Madras	5·6	−0 2	52·2		Mercara	0·6	−0·1	143·0
	Palur *	10·4	+3·4	69 9					
	Tindivanam *	4·2	0·0	47·9	Hills	Kodaikanal	1·6	−2·8	73·4
	Cuddalore	7·8	+0·6	77·3		Coonoor			
Central	Vellore	1·4	−1·3	37·2		Ootacamund *	1·3	+0·1	53·7
	Salem	0·4	−0·6	39·7		Nanjanad *	1·0	−0·7	52·4
	Coimbatore	3·3	+2·1	40·9					
	Coimbatore A. C. & R. I.*	3·3	+1·8	33·7					
	Trichinopoly	2·4	−0·2	36·7					

* Meteorological Stations of the Madras Agricultural Department.

@ From average rainfall for the month calculated up to 1937 (published in Fort St. George Gazette).

The weather during the first three days of the month was generally dry over the whole area. But from the 4th till the 6th and again between the 11th and 14th the trough of low pressure over the south of the Bay was again active as in the month of November and occasioned widespread and locally heavy rain in the South East of the peninsula. On the 15th of the month conditions were unsettled in the south of the Bay but failed to develop into a depression. Conditions were again unsettled in the South East of the Bay on the 20th, and developing into a depression on the next day moved north east and crossed the North Burma coast by the 23rd. Thereafter conditions were more settled and weather dry with a tendency for falling temperatures over South India.

Rainfall was in large excess locally in the Coromandel Coast, and in the Central Districts and normal or in defect elsewhere.

Other climatic elements were nearly normal. The chief falls reported were:

Panruti	(South Arcot)	8·1″	(4th)
Chidambaram	(do,)	6·7″	(,,)
Tiruchendur	(do.)	6·1″	(,,)
Vridhachalam	(do.)	6·2″	(5th)
Cuddalore	(do.)	5·7″	(4th)
Porto Nova	(do.)	5·6″	(5th)
Negapatam	(Tanjore)	5·3″	(6th)

Note on the total rainfall for 1940. The rainfall for the twelve months of the calendar year 1940 was characterised by its being in very large excess over the whole presidency with the exception of parts of the Ceded districts and the Nilgiri hills.

The first three months of the year were generally dry except for locally heavy rainfall in the northern districts due to the effect of secondary low pressure areas derived from western disturbances traversing the upper part of the peninsula.

During the hot weather months of April and May rainfall was generally in excess owing to thunderstorm activity during April and with the formation of a depression in the Bay which stimulated a temporary advance of the monsoon in May, when heavy rainfall occurred in the Circars.

The monsoon set in over the peninsula early in June and continued strong during July and August. During these months rainfall was in excess in Malabar coast and in the Circars. The rainfall was generally below normal everywhere during September and ontside the Ceded districts in October, but in November the weather over the south was continuously unsettled and rainfall in large excess, these unsettled conditions extended till the middle of December and rainfall was again heavy in the south during that period.

The annual rainfall was in large excess over the whole of the presidency outside parts of the Ceded districts and Nilgiris and most markedly so in the Ganjam district of Orissa, and on the Coromandel Coast and in parts of the Central districts, West Coast and Mysore.

Weather Report for the Agricultural College and Research Institute Observatory:

Report No. 12/40.

Absolute maximum in shade	...	89°F
Absolute minimum in shade	...	58·0°F
Mean maximum in shade	...	83·1°F
Departure from normal	...	−0·7°F
Mean minimum in shade	...	66·0°F
Departure from normal	...	+0·9°F
Total rainfall for the month	...	3·29″

Departure from normal	...	...	+1·8″
Heaviest fall in 24 hours	...	...	1·40″
Total number of rainy days	...	...	6
Mean daily wind velocity	...	...	1·23 m. p. h.
Departure from normal	...	...	−1·73
Mean humidity at 8 hours	...	...	78%
Departure from normal	...	...	−0·8%

Summary. Under the influence of unsettled weather, rainfall was in large excess. Skies were generally moderately clouded. Day and night temperatures were nearly normal. P. V. R. & R. S.

Departmental Notifications.

Gazette Notification.

Transfers.

Name of officers.	From	To
Sri. U. Vittal Rao,	Offg. Asst. Marketing Officer, Madras,	Offg. Asst. D. A., Tellicherry.
„ G. Ganapathi Ayyar,	Asst. in Chemistry, Agri. Res. Inst. Coimbatore,	Offg. Asst. Agri. Chemist in charge of the Agri. Res. Station, Siruguppa.

Leave.

Name of officers.	Period of leave.
Sri. K. T. Alwa, Headquarters Dy. Director of Agriculture, Madras.	L. a. p, for 4 months from 16-2-41 preparatory to retirement.
„ C. V. Ramaswami Ayyar, Asst. Agri. Chemist. A. R. S. Siruguppa.	L. a. p, for 2 months and 26 days with effect from the date of relief.

Subordinate Services.

Transfers.

Name of officers.	From	To
Sri. R. Narasimha Ayyar,	A. D. in Mycology St. Thomas Mount,	Mycology section, Coimbatore,
Mr. Herbert Adiseshaiah,	A. D, Vellore,	Sugarcane Resaarch Station, Gudiyattam.
„ S. D. S. Albuquerque,	Botanical Asst., A. R. S. Pilicode,	A. R. S. Neleswar III.
„ S. V. Kuppuswami,	Asst. in Chemistry, A. R. S. Siruguppa,	Asst. in Chemistry Section, Coimbatore.
Sri. E. Kunhappa Nambiar,	Upper Subordinate (on leave)	F. M. Taliparamba.
Janab Soopi Hajee	Asst. F. M. Taliparamba	Asst. A. D. Manjeri.
Sri. C. Raman Moosad,	A. D., Manjeri,	A. D., Wallajah.
„ M. A. Balakrishna Iyer,	A. D. Wallajah,	A. D., Vellore.
„ S. P. Fernando,	Asst. A. D. (on leave),	A. D. Ramnad.
„ A. B. Adisesha Reddy,	A. D. (on leave),	A. D., Guntakal.
„ M. Vaidyanathan,	A. D. Guntakal,	A. D., Rayadrug.

Leave.

Name of officers.	Period of leave.
Sri. M. S. Kylasam, Asst. to the Entomologist, Coimbatore.	L. a. p. for 30 days from 30-1-41.
„ S. Madhava Rao, F. M. Central Farm, Coimbatore.	Extension of l. a. p. for 28 days from 12-1-1941.
„ A. Shanmugasundaram. A. D., Pattukottai.	L. a. p. for 25 days from 16-1-41.
„ K. Hanumantha Rao, A. R. S., Pattambi.	L. a. p. for 49 days from 20-1-41.
„ D. S. Subramania Ayyar, A. D., (on leave).	Extension of l. a. p. on m. c. for 6 weeks from 24-12-40.
„ M. Vaidyanathan, A. D., Guntakal.	L. a. p. for 3 months and 15 days from 15-1-41.
„ G. Venkataramana, A. D., Bapatla.	Extension of leave on half average pay on m. c. for 1 month from 24-12-40.
„ M. Bhavani Shanker Rao, Asst. Groundnut scheme, A. R. S., Tindivanam.	Earned leave for 30 days from 6-1-41.
„ L Krishnan, A. D., Tanjore	Extension of l. a. p. on m. c. for 6 weeks from 9-1-41.
„ V. Achyutharamiah, A. D., Jami.	Extension of l. a. p. on m. c. for 6 weeks.
„ K. Sreeraman, Asst. in Chemistry, A. R. S., Siruguppa.	L. a. p. for 29 days from 3-1-41.
„ C. K. Ramachandran, Asst. in Cotton, D. F. S., Hagari.	L. a. p. for 30 days from 3-1-41.
„ N. Ranganathachari. A. D., Dhone.	Extension of l. a. p. for 1 month on m. c from 19-12-40.
„ V. Ratnajirao. A. D., (on leave).	L. a. p. for 4 months with m. c. from 16-12-40.
„ C. S Gopalaswami Rao, Mycology Asst. Bellary.	L. a. p. for on m. c. for 2 months from 7-1-41.
„ Raman Moosad, A. D , Manjeri.	L. a. p. for 1 month from the date of relief.

Agricultural College and Research Institute, Coimbatore.

Additions to the Library during the quarter ending 31st December 1940.

A. Books.

1. *Elementary Lessons in Agriculture in Telugu.* Jogi Raju, G (1940) 2. *'Pandlu' — Fruits Part I — General in Telugu.* Jogi Raju, G. (1936). 3. *'Pandlu'— Fruits Part II — Mango in Telugu.* Jogi Raju, G. (1940). 4. *Elementary Agriculture.* Mitra, S. K. (1940). 5. *Sarola Kasar: Study of a Deccan Village in the Famine Zone.* Jagalpure, L. B. & Kale, K. D. (1938). 6. *Price Fixing by Government in Foreign Countries, 1926-1939 – A selected list of references* Hannay, A. M. (1940). 7. *Agricultural Produce Act, 1937 with rules made prior to 31st August 1940.* Government of India Publication. (1940). 8. *Report on the marketing of Grapes in India*

& Burma - Marketing Series No. 20. Government of India Publication. (1940). 9. *Report on the marketing of Coffee in India & Burma - Marketing Series No. 121.* Government of India Publication. (1940). 10. *Report of the Committee on Co-operation in Madras - 1939-40.* 11. *Planting Directory of Southern India.* U. P. A. S. I. Publication. (1940). 12. *Plant Physiology - A Text Book for College & Universities.* Meyer, B. S. and Anderson, D. B. (1940). 13. *Colorimetric methods of Analysis - Volume II - Organic and Biological.* Snell, F. D. & Snell, C. T. (1937). 14. *Diptera - Volume VI - Family Calliphoridae (Fauna of British India Series).* White, R. S. & others. (1940). 15. *Records and Research in Engineering and Industrial Science.* Holmstrom, J. E. (1940). 16. *Utilization of Indian Vegetable Oils and Lubricants in Internal Combustion Engines.* Aggarwal, J. S. and Verman, L. C. (1940). 17. *Broadcasting in India - The first report (1938-39) of the office of the Controller of Broadcasting.* Government of India Publication. (1940).

B. Annual Reports of The Agricultural Department etc.

1. Proceedings of the Association of Economic Biologists, Coimbatore. (1938). 2. Administration Report of the Madras Electricity Department for the year 1939-40. 3. Annual Report of the Mysore Agricultural Department for 1938-39. 4. Report on the Administration of the Meteorological Department of the Government of India in 1939-40. 5. Annual Report of the Agricultural Meteorology Section, Indian Meterological Department for 1938-39. 6. Proceedings of the 29th meeting of Advisory Board of the Imperial Council of Agricultural Research. 1940. 7. Administration Report of the Baluchistan Agency for 1938-39. 8. Annual Administration Report of the Department of Agriculture-United Provinces for 1938-39. 9. Annual Report of the Department of Agriculture-Baroda State-for 1938-39. 10. Report on the Experimental Farms in the Central Provinces and Berar-for 1938-39. 11. Proceedings of the Indian Society of Soil Science, 1939-40. 12. Report on the operations of the department of Agriculture, Burma for 1939-40. 13. Report of the Agricultural Stations in Burma for 1939-40 14. Annual Report of the Grain Research Laboratory, Winnipeg, Manitoba, Canada for 1939. 15. Annual Report of the Department of Agriculture, Malaya for the year 1939. 16. Canadian Seed Growers' Association-Annual Report, 1937-38. 17. Report of the Department of Agriculture—British Honduras-1939. 18. Cornell University Agricultural Experiment Station-Annual Report for 1939. 19. Annual Report of the Iowa Agricultural Experiment Station for 1938-39 20. Annual Report of the Iowa Corn Research Institute for 1938-39. 21. Transaction of the Iowa State Horticultural Society for the year 1939 22. Annual Report of the Nebraska Agricultural Experiment Station for 1939. 23. Annual Report of the Ohio Agricultural Experiment Station for 1937-38.

New Periodicals

Report on the Seaborne Trade of the Province of Madras for the year 1939-40.