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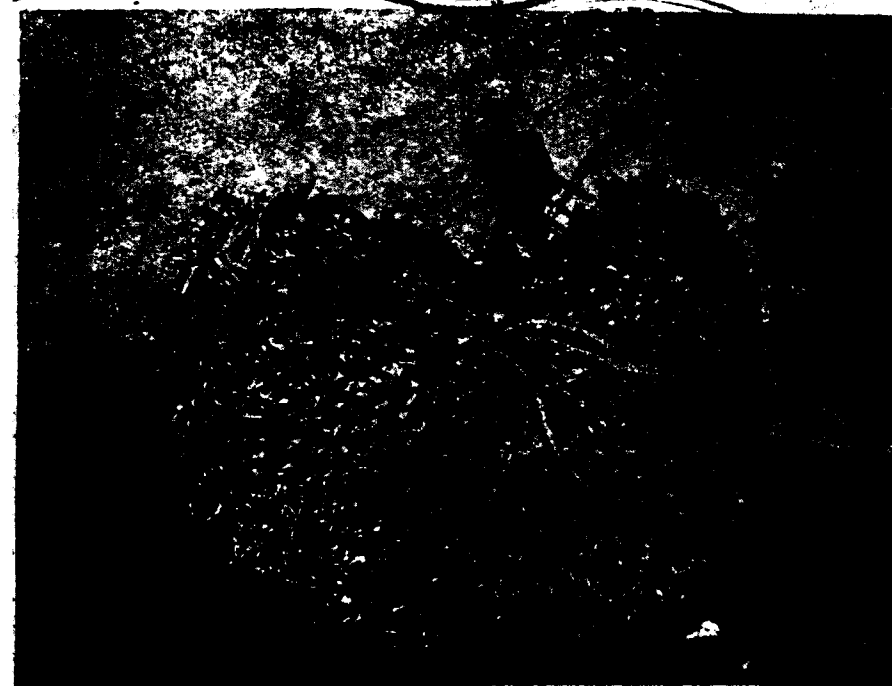
THE
Madras Agricultural Journal

CLII



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No. 6



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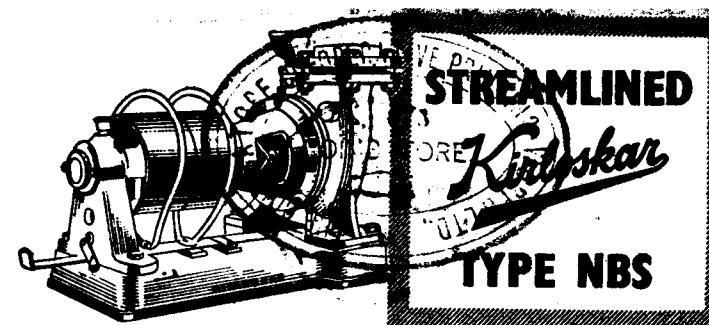
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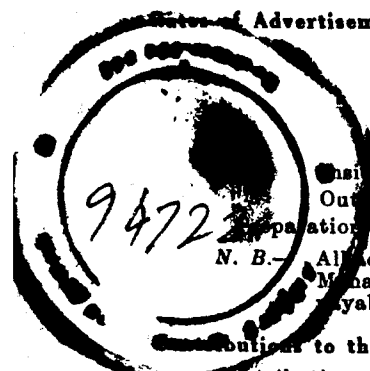
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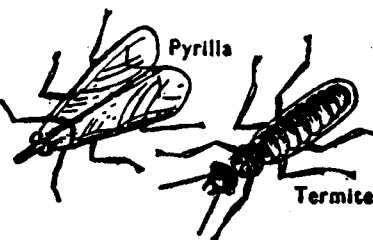
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Announcement

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1955

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The Annual College Day and Conference of the Madras Agricultural Students' Union has been decided to be held this year during the third week of August. The subject for the symposium will be "What next in Agricultural Research and Extension Programme?"

Persons desirous of contributing papers for the symposium are requested to communicate to the Secretary.

It is likely that all officers of the department, gazetted and non-gazetted, would be permitted to come on duty to attend the Conference at their own cost and as such are cordially invited to attend the function and make the best of the opportunity provided.

All members are earnestly requested to donate liberally and help to make the Celebration a success.

P. Madhava Menon,

Secretary,

The Madras Agricultural Students' Union.

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Editorial

Life span and our diet: The Royal jelly, the wonder elixir prepared by honey bees to assure the longevity of their queen bee was discussed at the last meeting of the French Scientific Society for nutrition in Paris. Though the researchers were not yet sure of its value in human nutrition and its potentiality to increase the span of life, the imagination of the public caught on to this new elixir of life and many a commercial firm made capital out of it. While this is still in the realm of speculation which future research alone would set at rest, we have many concrete results achieved in our dietary needs by scientists of the day. Consequently, according to Sebrell of the United States National Institute of Health, the life expectancy beyond the fiftieth year has gone up to 22 percent in 1950 from 13 percent in 1900 and may be 24 percent in 1960. Nutritional research has given a very fruitful approach to this problem of increasing our life span and also to keep ourselves in good health all the time.

Credit for this achievement must go to the intensive studies made in accessory nutrients like the vitamins and minerals. To this has lately been added the antibiotics which have become more nutrient materials than their original role of bacteriostatic agents.

Major health problems mitigating against longevity in which nutrition is implicated are many. Obesity is one in which the characteristic feature is the failure of the appetite to maintain the calorific balance. Diabetes is another metabolic disease in which faulty utilization of the carbohydrate causes the affliction of millions of people in the country.

Though controlled by insulin its prevention and cure are still unknown. Gout involving the deposition of a metabolite, viz sodium urate, is still another nutritional disease, whose cause, prevention and cure are still obscure. When these nutritional diseases are well understood and prevented it would go a long way to increase health and life span of mankind. Our leading killers are however cancer, diabetes and nephritis. In cancer, there is a tendency for the tumour metabolism to be glycolytic as in the case of tissues with inadequate supply of oxygen. Uncontrolled synthesis of protein is another metabolic problem in cancer and nutrition offers a fertile field to study the control of these major killers which reduce the life span without realising our full age potential.

While increasing one's life span in full health is the major problem all over the world, in India we have the added problem of inadequacy of even the major food stuffs to keep body and soul together. Consequently, it has become the pre-occupation of scientists in India to find substitutes and make more and more adjustments in the dietary needs of the people of the country. The "toned" milk to be supplied from the month of July for the Madras City is the most recent of such adjustments necessitated by the lack of the genuine cows milk. "Toned" milk is prepared by diluting buffaloes milk with equal quantity of water with the proper proportion of skimmed milk powder so as to attain the standard and quality of fresh cows milk in total-solids, solids-not-fat and fat.

Prior to this we had the new formula for balanced diet propounded for the poor by Prof. Giri and Dr. Rajagopalan of the Indian Institute of Science, Bangalore, described as a multipurpose food containing all ingredients essential for nutrition and said to be made up of a mixture of groundnut cake, gingelly cake, and soya bean powder. This again is an adjustment necessitated by the lack of the real genuine material like meat, pulses, eggs, and milk which are in short supply and costly to reach down to the rank and file of the people. Still earlier to this is the example of the synthetic

rice, rich in proteins, which was produced and standardised four years back at the Central Food Technological Research Institute, Mysore. This is made by processing groundnut cake with tapioca flour. In spite of all these substitutes devised by our scientists very few have taken to these alternate sources of food. Dr. McCarrison while at the helm of affairs at the Coonoor Nutritional Institute had shown some thirty years ago that the rice eater of South India has need to supplement his rice with enough milk, pulses, green leaf vegetables and fruit to live in good health. During these thirty years our economic condition has not risen to the stage when we can afford all the aforesaid food materials to supplement adequately our requirements.

Even our net calorific requirement per capita remains nearly 600 to 1,000 calories lower than the average requirement. This is, therefore, the cause which motivates our scientists to present ways and means of adjusting our dietary set up to tide over the inadequacies of our present food. But this at the most is only a make-shift arrangement and our main objective should be to attain the real articles of food as recommended by McCarrison instead of living on substitutes. The sooner we tide over this reign of substitute food materials the better it will be for the Nation and for the expectancy of our people. And the solution is in the hands of our Farmers and Dairymen who should strive to get more and more out of the land and the cow to supply enough protein and milk to the people of the country.

A Production Plan for Raw Cotton in the Madras (Undivided) State

by

R. BALASUBRAHMANYAM
Principal, Agricultural College, Coimbatore

(Continued from May issue Vol. XLII, p. 165)

Crop Mixtures — Long Term: The advantages of mixed cropping have been widely recognised by the dry land farmers of the Madras State and consequently it is common feature in almost all districts. John et al (1943) and Balasubrahmanyam (1950) have summarised the experimental data recorded at the Agricultural Research Stations while the latter had further opportunities for observing the potentialities under the Cotton Extension Scheme during the years 1950 to 1953 both on the Government farms and on the cultivators holdings.

The majority of dry land farmers in Madras State grow pure crops of groundnut continuously on the same land without any rotation while poorer cultivators owning small areas prefer to raise other crops mixed with it. The various crops with which groundnut is commonly sown mixed under rainfed conditions are gingelly and redgram in Visakhapatnam and Godavari; *Jowar*, Kodo millet, cotton, redgram and castor in Guntur, Krishna and Ceded Districts; redgram and castor in the Central Districts and redgram, *Jowar*, *bajra* and gingelly in South Arcot, Chingleput and Tanjore depending on types of soil and the rain pattern. The normal area under groundnuts in these districts is forty lakh acres per annum, a part of which alone is now being sown mixed with redgram, gingelly, castor, cotton or millets. A cotton crop will admirably suit such mixed cropping since the feeding zones of the shallow rooted groundnut and the deep rooted cotton lie at different soil depths and no competitive or depressing effects have been noticed in all the trials conducted so far. Mixed cropping with cotton is not only the most remunerative practice but is also an effective insurance against vagaries of the season and risks from damage by pests and diseases which the groundnut crop is usually subject to.

The crop of chillies grown as a rainfed crop over a lakh of acres in the districts of Guntur, Krishna, East Godavari and West Godavari is generally subject to severe damage bordering on total failure by an insect called thrips. The farmers who are obliged to

manure heavily, to cultivate the land properly and to raise healthy nurseries at considerable cost, suffer monetary losses which cannot be avoided even with the planting of thrip tolerant varieties like G 1 evolved at Guntur. Consequently, the area under the chilli crop has been steadily going down. Some of the farmers in East Godavari district are growing even today, chillies mixed with red cocanadas cotton. The chilli plant does not suffer by shading or competition effects of cotton which on the other hand bears a heavy crop on account of both the wide spacing of 7' x 5' adopted and liberal quantities of manure applied to the chillies. Experiments on such mixed cropping were conducted for over three years at the State farm in Guntur. The extra gross monetary return from the mixed crop ranged from Rs. 10/- to Rs. 90/- per acre depending on the extent of thrip damage, and in no year the return from mixed crop was lower than the pure crop. The device should therefore serve as an effective insurance in thrip-infested years and a harmless practice in thrip-free seasons. The cultivator runs no risk in any year and will produce on an average 40 lb. lint from every acre of such mixed crop.

Some farmers of Ramanathapuram and Tirunelveli Districts were cultivating Cambodia cotton as a mixture with irrigated finger millet. Of late, the area under such mixed cropping, has considerably dwindled mainly due to the attractive prices ruling for the food crop. The planting of finger millet and cotton (invariably Cambodia) is simultaneous and done in the months of August and September. Finger millet seedlings are transplanted in beds while the seeds of the Cambodia cotton are dibbled in both beds and on the sides of ridges. Sometimes it is also usual to broadcast the cotton seeds, form beds and transplant finger millet seedlings. There is no apparent difference between the two methods except in the ultimate seed rates. Hand dibbling requires about 6 lb. of cotton seed while broadcasting needs double this quantity. The cereal which outgrows cotton rapidly is harvested by the first week of January when a good hoeing and earthing up is given to cotton. The crop responds remarkably to the cultivation and yields a good harvest by the end of March. The farmers have not only not experienced any fall in the yield of finger millet in such associated cropping, but have actually obtained good yields of cotton depending on the fertility of the land and irrigations given till the middle of April. The farmers would be well advised to revive this sound practice which would reduce the gap in internal production of raw cotton in the country.

In the districts of South Arcot, North Arcot and Chittoor, the usual practice is to plant finger millet in the month of January and dibble later at the time of first hoeing the spreading variety of groundnut or sow bunch variety of groundnut at the time of the harvest of the cereal crop. Sometimes Cambodia cotton is grown after the harvest of cereal in March. Experiments were conducted at the Agricultural Research Station, Palur and observations were made on the cultivators' lands in all the three districts by planting cotton of the Uganda type along the ridges separating two contiguous beds and the irrigation channels. The seeds were planted after pre-treatment with cowdung and red-earth at distances of six to eight inches on the inner sides of ridges on the same day as the cereal was transplanted. A life irrigation was given after three days. Subsequent interplanting of groundnuts and treatment of the crop were in no way different in such mixed cropping as compared to the normal practice. The cotton crop was observed to grow well and did not in any way interfere with the ragi or groundnut. Their yields were not affected and cotton gave 100 to 475 lb. of kapas per acre depending on the dates of planting, soil fertility and frequency of irrigations. The harvests of cotton crop were completed by the time the groundnut was ready for lifting. No special treatment to cotton will be required in such mixed cropping except for irrigations, intercultural operations and manuring given to the cereal. Although Uganda cotton was found to be a good type for mixing with finger millet and groundnut raised under irrigation during summer, Punjab 216 F which had a short duration was found more suitable in the areas where water was the limiting factor or where the bunch groundnuts had to be harvested earlier than in spreading variety. The quality of Punjab 216 F being very much similar to that of Uganda Cotton, should be preferred in such areas. Observations made on cultivators' holdings in Chittoor, South Arcot and North Arcot districts have also shown that cotton varieties like P 216 F could be grown mixed with irrigated summer groundnuts. The cotton crop came to harvest along with groundnut and no ill effects like shading of cotton plants on groundnut crop were noticed. The cotton plants were vigorous and prolific in yield. No extra expenditure was involved on manuring and irrigation by interplanting cotton in the groundnut crop. Yield as high as 400 to 500 pounds of kapas were obtained in addition to the normal yield of irrigated groundnut, thus bringing definite extra income to the cultivators. In the fourteen trials conducted on cultivators' holdings during the year 1951 MU 1 mixed with groundnut and finger millet, yielded on

an average 804 lb. and 677 lb. seed cotton per acre respectively while P 216 F. mixed with finger millet recorded 842 lb. per acre. The farmers of the districts of Chingleput, Chittoor, North Arcot and South Arcot can help in the production of more cotton, relieve the pressure on foreign exchange and benefit themselves by earning an increased profit of Rs. 50/- to Rs. 200/- per acre.

In Nellore, the finger millet crop planted in the months of November and December usually come to harvest in April and May. If cotton varieties like P 216 F having more or less the same duration could be grown mixed with it all along the ridges separating beds and also along the irrigation channels in such fields, it should be quite possible to extend this method over a greater part of 97,000 acres reported to be under finger millets annually in Nellore. A seed-rate of 6 to 8 lb. of cotton will be sufficient to plant one acre. The finger millet can be transplanted first and immediately it is over, cotton can be dibbled on the ridges separating beds at the rate of three seeds per hole spacing them about six to nine inches. A life irrigation may be given on the fourth day after such planting in order to soften the crust that may form and to help the germinating seedlings in pushing out the hardened soil at the top. Thereafter no special treatment to cotton is required except for the irrigations, inter-cultivations and manuring which might be the same as given to the cereal crop.

The cultivators in parts of Guntur and Krishna now grow one line of red cocanada cotton mixed with five to twenty one lines of groundnut in the months of June to August. The bunch variety comes to harvest in October while the spreading type is lifted in November or a little later. The cotton remains on the land till the end of March. The long duration of cotton necessitates keeping watch over the fields for preventing damage by cattle. A similar practice to a limited extent is also prevalent in other districts like Bellary, Anantapur, Kurnool, Ouddapah, South Arcot and Chingleput where the local varieties of cotton viz. Westerns 1, Mungari, Northern and Cambodia are grown in association with groundnuts and cereals on lands of medium and high fertility under raingrown conditions.

The defects in duration and quality of local cottons were sought to be eliminated by replacement with short duration type capable of completing the harvests by the end of November i.e. a fortnight later than bunch variety of groundnuts. Experiments

conducted at Guntur showed that the early cotton variety H. 420 mixed with groundnuts in the proportion of 1 to 14 could yield gross gains ranging from Rs. 15/- to Rs. 75/- per acre depending on the soils and seasonal conditions. The cotton crop completed the harvests by the end of November and yielded on an average 40 lb. lint per acre. Trials conducted at Hadagalli in Bellary district showed that when the cotton-groundnut mixture was sown during the second week of July, the groundnut crop came to harvest by the end of October, while cotton has to be retained up to December. The yields obtained per acre were 25 maunds of cotton and 10 bags of groundnut. The ruling prices on the date were Rs. 20/- per bag in the case of groundnut and Rs. 10/- per maund for cotton. The net profit realised by the mixture was Rs. 299/-. Favourable reports of similar nature were also received from Mantralaya in Bellary district where a farmer grew such a mixture voluntarily under advice. The groundnut sowings were done in the first week of July in rows of 27 inches apart and Westerns 1 cotton was sown between the groundnut rows in September. Groundnut was harvested in October and Cotton was allowed to stand on the field till March. The yield of cotton crop was remunerative and in later observations better yields were realised when cotton was sown in August itself.

All farmers of the State planting *kharif* crops on drylands will generally benefit if they sow short duration cotton H. 420 mixed with groundnut. In the districts of Salem, Coimbatore, Tiruchirappalli and Mathurai where the Pest Act is under operation, H. 420 can be grown with advantage since there is no prohibition against the retention of a non-American variety beyond September. One row of cotton can be sown for every 5 to 21 rows of groundnut depending upon the conditions of the tract. In Bellary, Cuddapah, Kurnool and Anantapur districts, Luxmi variety of cotton can be dibbled in the standing crop of groundnut in the month of August on the lighter soils while the Westerns cotton must be sown on deeper soils in the month of September.

The popularity of 420 cotton which was imported in large quantities from Madhyapradesh State and distributed under the Cotton Extension Scheme in the Ceded districts of Bellary, Anantapur, Kurnool and Cuddapah for being grown as a mixed crop with groundnuts and cereals in July has been well-established and it is finding favour in the circars especially Guntur and Kistna districts for the same purpose. Its extension in other groundnut

regions of Coimbatore, Salem and Tiruchirappalli can be achieved only slowly under steady and intensive propaganda. The cultivators appear to prefer the Punjab American variety P 216F or the Madras American Cotton MU1 in the districts of Chingleput, North Arcot and South Arcot for mixing with groundnuts and finger millets. The Westerns and Northern cottons are still in great demand when sown mixed with cereals during August. The efforts of the departmental staff in extending the cultivation of chillies mixed Coconada cotton in the Circars were unsuccessful. The main reasons were the soaring prices of chillies and the comparatively low prices offered for red cotton, the availability of insecticides at concessional rates for controlling thrip damage, the need for preventing cattle trespass and keeping watch over standing crop of cotton in such mixed crop areas long after the harvest of associated chillies. The practice is unlikely to extend unless short duration medium staple cotton varieties having the same crop life as chillies are evolved and there is parity in these prices of the two crops. The problem of cattle trespass can be solved only when farmers join together and grow the mixture in contiguous compact areas in each village.

Cultivation of Sea Island cotton in West Coast Long term: The rainfall and humidity of South Kanara and Malabar offered immense possibilities for the development of high quality cottons like Sea Island on the model of West Indies. Small scale trials were conducted in the year 1947 and later elaborated under a special scheme financed by the Indian Central Cotton Committee, Bombay. The experiments have reached a stage where the problem is not whether Sea Island can be grown but what agronomical treatments are to be done for making its cultivation remunerative to the growers. Early planting and application of fertilisers appear to be indispensable for success. The average yield per acre has to be pushed up to the level of 100 lb. lint. The process will prove less difficult if varieties having a shorter staple of about $1\frac{1}{4}$ " and higher ginning out-turn are evolved. It is possible to extend its cultivation as intercrop in coconut plantations covering four lakh acres, in *modan* lands over 65,000 acres during fallows and in another 65,000 acres of *Kumeri* lands where a system of shifting cultivation is practised. The cotton grown in the experimental area has been well commented upon by the Indian mills who manufacture sewing thread and who are obliged to import costly Egyptian cotton for such a purpose.

Improvement of farming practices Long term: The farmers in the blacksoil tract of Coimbatore District harvest their rain-grown *Periamanjil Jowar* in the month of February leaving 6 to 9 inches of the stubbles in the soil. These stubbles remain in the field till the cultural operations for the succeeding cotton are started in July and invariably ratoon after the summer showers. The limited moisture is thereby depleted during the hot months. The Karunganni cotton sown on such lands often records low yields especially in years when the South-West Monsoon is weak the North-East rains are late. The reduction of the rainfed cotton amounts to 10 to 15 percent over an area of 50,000 acres in the district.

If the stubbles of cholam are immediately removed by working blade harrow instead of allowing the stubbles to stand on the field until sufficient rains are received for ploughing the field, the depletion of soil moisture can be prevented. The yield of the succeeding cotton crop which is increased by about 8 lb. of lint per acre more than compensates for the charges incurred on post harvest operations. It is a very minor variation of the local farming practice whose wholesale adoption in the district of Coimbatore and Trichinopoly will augment the output of Karunganni cotton to the extent of 1000 bales of lint per annum.

In this State, Cambodia is grown in two seasons viz., cold weather and summer months. The major area is cropped in cold weather corresponding to the period September–April between planting and end harvests. The early planting in September is largely in vogue in the taluk of Coimbatore where the farming system is aligned on an intensive *jowar*–cotton rotation, with September–March for Cambodia and March–July for *jowar*. In the late-sown tracts of Coimbatore, Salem, Tiruchirapalli and Mathurai Districts which constitute the bulk of the acreage, the prevalent rotation is finger millet–cotton or *bajra*–cotton partitioned on the basis of June–September for cereal and October–April for cotton. Water stress and seasonal limitations have circumscribed the components of the existing rotations, and the advantage of September planting could not be extended in *toto* in the late-sown areas. The experiments conducted on the agronomy of the crop at Coimbatore with the popular strain MU 1 in recent years by Kannian and Balasubrahmanyam (1952) have demonstrated that close spacing of 3" in line with 30" between rows (equivalent to 79,000 plants per acre) recorded the highest yields per acre

irrespective of sowing dates. Hence close planting of a late crop will never compensate for the delay in planting under Coimbatore conditions. The difference in yields between the normally planted and close planted crops was roughly 200 lb. seed cotton per acre. It was also found that planting in line on ridges and irrigating in furrows economised water and gave as much yield as the local system in which the sowing was broadcast and irrigation was through flooding in beds. The subsequent operations like weeding and hoeing could be done efficiently with labour saving implements like Junior hoe worked with bullock power as against costly mamoty and hand hoe requiring a large contingent of men and women. The practice merits large scale extension in the whole of Cambodia tract in Madras State.

Weather hazards Long term: In the raingrown tracts, the limiting factors affecting production are soil, drought, untimely rains and atmospheric temperature. The soil drought in arid regions is very much interrelated with erosion; control and soil conservation methods which cannot be accomplished without state aid. Bunding, tie ridging, wide spacing and drought evading varieties are the commonest recommendations made with regard to Ceded districts which grow seven lakh acres of cotton in normal years. Contour bunding as a soil conservation method has been done on a limited scale in the Bellary district. It will not be possible to cover very large areas in short time even with state aid. Private effort is equally indispensable, if substantial annual progress is to be ensured.

Cambodia Cotton in South Arcot District is at present planted in the month of March and irrigated from wells in the same manner as the *masipattam* Uganda cotton grown in the taluk of Srivilliputtur and its contiguous areas. The crop though extremely satisfactory from the point of growth and healthy appearance is very disappointing in seed cotton yields which seldom exceed half to two-thirds of the Srivilliputtur average. In addition, other defects like imperfect boll opening and poor seed germination are also noticed. Liberal applications of manures or irrigation water fail to correct them. The problem was taken up for a closer and intensive study at the Agricultural Research Station, Palur in South Arcot District from the year 1944. Flower drop was observed to follow periods of high atmospheric temperature and examination of such shed flower revealed the presence of a large proportion of defective pollen. It was concluded that if the hot periods during flowering and fruiting periods could be avoided, the various defects

could be rectified. Experiments aimed at forcing early maturity through (a) shifts in planting dates (b) close planting and (c) development of short-duration varieties, were conducted for over three years from the year 1946. The conclusions were that December planted crop of Uganda-1 always gave three times the yield of March-sown cotton, and that close planting combined with frequent irrigations during hot months increased the yields further. The quality of seeds, however, remained generally poor though some improvement in germination was registered. The cotton farmers of South Arcot, who are likely to experience the ill-effects of hot summer on the *masipattam* crop will therefore be advised (a) to plant cotton early in the months of December-January (b) to choose early duration varieties recommended by the Agricultural Department (c) to plant cotton close and irrigate frequently during hot periods (d) to use only seeds from other districts for sowing purposes and (e) to manure the early-planted cotton in preference to late-planted areas. The wholesale adoption of the above recommendations will help every farmer to treble his profits per acre and place the production of long staple cotton in Madras and India on a sound basis.

The main reason for the slow adoption of the above experimental finding by the farmers of the district is on account of their present practice of growing short duration finger millets in January and following it up with summer cotton in March. The defect can be partly got over if cotton can be grown as mixture with finger millets even in January and treated as a pure crop from March after harvest of cereal or if cotton is grown unmixed with finger millets in December-January since the nett profits will be more than either the mixed cropping or the one following the other. In the context of the present ruling prices for certified M U 1 cotton and falling prices of finger millet, pure cropping is bound to prove comparatively more remunerative.

The Karunganni crop of Tinnies area is subject to shedding of floral parts during periods of untimely rains in the month of February and to low yields in years of subnormal rains. On account of these hazards, the mean yield of the area has been fluctuating. Both these defects have been avoided through evolution of early maturing and drought resistant strain K. 2. whose spread will stabilise the annual production. The new variety K. 2. has recorded average yields of 350 lb. of kapas per acre even in a year of drought while the yields of the local variety ranged from total failure to

200 lb. per acre. Its outturn of lint in ginning and its mean staple length of 15/16 are other good points which have already attracted the attention of many mill-owners.

Homestead Cultivation—Long Term: The development of perennial cotton varieties for backyards, homesteads and unreclaimed waste blocks of average fertility, subject to outbreaks of malaria or labour scarcity offers another fruitful line of attack. The work done by Balasubrahmanyam (1950-52) has revealed that under the present day conditions which make possible the effective control of insect damage through pesticidal dusts and sprays, the evolution of suitable varieties in American 'Deshi' and first generation hybrids is desirable. In the State wide trial conducted over three years Moco with its long fine staple and resistance to pests among the South American perennials, Nadam in the short staple group among indigenous types and first generation hybrids between Moco and Cambodia hold out fair promise for extension depending on the conditions of soil and rainfall in the respective districts. The production will meet at least the entire needs of Khadi and extra factory consumption which may be placed at 20,000 bales per year if a concerted effort is made for their propagation.

Breeding Better Varieties—Long Term: Madras has organised her research in such a way as to tackle regional problems relating to every trade variety in one of the permanent Agricultural Research Stations financed by the State or in special schemes subsidised by the Indian Central Cotton Committee, Bombay. The main aims of the breeding programmes are improvement in yield per unit area, higher ginning outturn, longer staple, better maturity of fibre, greater adaptability over a wider range of agricultural conditions and capacity for resistance to adverse factors like drought, pests and diseases.

The cultivated varieties of *arboreum* and *herbaceum* in Madras are low ginners ranging from 23% to 33% while most of the *arboreums* and *herbaceums* grown in other parts of India possess a higher ginning outturn. Varieties from *cernuum*, *bengalense* and *herbaceum* were used for hybridising with local types. All strains under release or in advanced stage of the trials in the various *deshi* cotton areas are mainly those derived from the progenies of the above hybrids. The low ginning trade varieties viz., Northern, Western, Cocoonadas, Chinna pathi, Umri, Uppam and Tinnies are either in the process of gradual elimination or has been already displaced by higher ginning

hybrid strains and new extra-state introductions. The use of *herbaceum* strains from Broach & Viramgam for crossing with Westerns cotton has given high ginning biotypes. The introduction of H. 420 from Madhyapradesh has helped the slow elimination of short staple mungari and chinnapathi as well as low ginning umri. Eventually it may become popular in the Cocanada region too. The synthesis of long staple *deshi* cotton exceeding one inch by Ball's Sorter test is yet another achievement in the *arboreum* group of cottons. They are expected to spin 40's warp and give an even nep free yarn on account of their high maturity.

The improvements registered in American group of cottons are equally noteworthy. Persistent and continued reselections in intrahirsutum and interspecific hybrids involving exotic varieties from East Africa, Egypt and West Indies have yielded stable, productive, long staple, high ginning and adaptive types. In some of them, duration has been reduced, a ginning of 38% realised, staple lengths exceeding 13/16" reached and resistance to blackarm and jassids registered. A new long staple substrain from MU 1 capable of spinning 40's warp counts and adaptable for being grown on rainfed and irrigated winter as summer seasons was developed. The still later strain MU 2 can spin 50's warp although it has only adaptability. In the rain grown regions, Luxmi cotton from Dharwar has acquitted so well on the black soils of average fertility in Bellary district that the area shot up to nearly one lakh acres during last year as per estimates.

The discovery of P 216 F as a suitable cotton for short summer fallows of Tanjore and other areas enjoying irrigation facilities is the outcome of research undertaken with a special purpose. In the new variety P 23 F, the duration has been still further shortened by about a week. Since the year 1945-46, the wild cotton varieties were employed in hybridisation for evolving hardier and better races. The derivatives of hybrids with tetraploid (*taitense* x *darwinii*) and hexaploid (*hirsutum* x *raimondii*) were the most promising. The former group crossed with Combodia 4463 gave jassid and drought resistant strains while the latter group with Combodia 7682 (an interspecific multiple hybrid (*barbadense* x *hirsutum*)) yielded productive, high ginning and blackarm resistant biotypes.

A general idea of the staple length and ginning out turn improvements realised in the last quinquennium compared to the standards of the varieties under cultivation is given in Statement II.

STATEMENT No. II.

STATEMENT NO. 11.

Name of the variety	Parentage	Mean staple length 32nd inch.	Spinning value H. S. W. O.	Ginning out turn	Special attributes and defective traits
American Cotton:					
(a) Under cultivation:					
CO 2	Pure line selection from imported Cambodia	28 to 32	24/35	35	Late maturing, susceptible to stem weevil
CO 3	Derivative of a cross between CO 2 and South African uplands	30 to 32	28	37	Early maturing, susceptible to stem weevil and blackarm
MU 1	A reselection from a derivative of a cross between CO 2 and South African uplands	30 to 34	40/45	35	Very early, tolerant to blackarm
MU 2	An inter-specific multiple hybrid derivative	31 to 34	52	35	Very early, high spinning
P. 216 F.	A selection from Punjab	29	34	30	Very early suited for rice fallows, susceptible to red-leaf
Laxmi	G. 1 x CO 2 hybrid derivative	29	40	30	Early variety suited for unirrigated blacksoils of Ceded Districts
(b) Awaiting release:					
9030	Multiple hybrid derivative	31	42	36	Adaptable for Winter Cambodia tract
0734		30	42	34	
9095		30	39	34	
0744		31	40	36/34	
(c) Special traits:					
Sea Island	Montserrat in West Indies	48 to 36	100	28	Suited for rainfed cultivation in West Coast
Moco	G. <i>hirsutum</i> race <i>marie-galante</i> from South America	30 to 32	40	30	A good quality perennial variety for homesteads
Nadam	G. <i>arboreum</i> race <i>indicum</i>	18	12	23	An inferior quality perennial cotton resistant to droughty conditions
(darwinii x <i>taitense</i>) x <i>hirsutum</i>	Derivatives of hybrids with wild tetraploids	30 to 34	40	35	Culture 9-8-2 is jassid tolerant

STATEMENT No. II—(Contd.)

Name of the variety	Parentage	Mean staple length 32nd inch.	Spinning value H. S. W. G.	Ginning Out turn	Special attributes and defective traits
<i>raimondii</i> × <i>hirsutum</i> derivatives	Tetraploid derivatives of hybrids with hexaploids	30 to 34	40	32	Cultures 1-21 and 1-22 are blackarm resistant
Deshi Cottons:					
(a) Under cultivation:					
K2	Derivative of cross between <i>indicum</i> and <i>cernuum</i>	28 to 30	30	34	Escapes untimely February rains in Tinnevelles area
K5	do.	28 to 32	30	34	Adaptable for Coimbatore tract
N. 14	Pura line from Northern (G. <i>arboresum</i> race <i>indicum</i>)	28 to 30	40	26	Low ginning, high spinner, suited to high rainfall regions
C. 1	Derivative of interstrain cross within G. <i>arboresum</i> race <i>indicum</i>	28	30	28	Red cotton, light brown in colour
C. 2	Derivative of interstrain cross within G. <i>arboresum</i> race <i>indicum</i>	28	30	28	Red cotton, medium brown in colour
Ravalasema-1 (891-F)	Derivative of cross between <i>indicum</i> and <i>cernuum</i>	28	30	34	Late than Mungari local
H. 420	do.	27	26	33	Early variety, suitable for mixed cropping
Mungari	G. <i>arboresum</i> race <i>bengalensis</i>	16 to 18	10	26	A coarse short staple type
Chinnappathi	G. <i>arboresum</i> race <i>indicum</i>	16 to 18	10	26	Early maturing, short staple type
Westerns-1	Pura line from Westerns (G. <i>herbecum</i> var. <i>acerifolium</i>)	26 to 30	24	30	Early maturing, warty cotton
(b) Awaiting release:					
6186-9	Derivative of cross between <i>indicum</i> and <i>cernuum</i>	30 to 32	34	33	Adaptable Karunganni selections with good yield and spinning
6188-8	do.	do.	39	33	
6312-4	do.	do.	41	33	
6874	do.	do.	40	33	
2711	Derivative of (W. 1 × Improved Jayawant) × 1027-ALF	26 to 30	30	35	High ginner and low fibre weight
4224	Derivative of a cross between <i>indicum</i> and <i>cernuum</i>	30 to 38	40	33	Later in maturity than N. 14 better in ginning and yield

The particulars also include new introductions and varieties developed for special purposes. It may be seen from the statement that all short staple varieties below $\frac{1}{4}$ " will be ultimately ousted and the whole of the Madras State will come under medium and long staple area.

Pests and Diseases Long and Short Term: Pink and spotted boll worms, stem weevil, jassids, red bug and leaf rollers among insect pests, and blackarm in diseases are the major affections in the province. The system of intensive cultivation of irrigated cotton involving a long non-cotton period of over five months has not very much altered either the initial incidence, crop loss or quality damage. The exclusion of desi cotton from the operation of cotton Pest Act and non insistence of any close period for unirrigated American cotton are responsible for the present pest situation. The damage caused by stem Weevil has been minimised by using the resistant Moco type as a parent. Further selection in the material is being pursued. The problem of Jassids has been fully investigated in the enquiries instituted both at Siruguppa and Coimbatore. The conclusions are summarised by Balasubramanyan and Kesava Ayyangar (1950) and Kannyan and Balasubramanyan (1952). Early and close planting of hairy resistant types offer the best solution. Gueserol 550 sprayed for controlling Jassid damage was found to reduce yields. Red strainers in South Arcot and boll worms all over lead to premature boll opening, stained cotton and poor quality lint. Insecticidal control is the only means of keeping them under some check in our present state of knowledge on their bionomics and life history. Breeding for resistance to boll worms using the wild cotton *thurberi* is already figuring in the programmes but it will prove to be a very slow and long drawn task requiring good deal of knowledge and patience for the proper synthesis. The extended use of methyl bromide for fumigation of all sowing seed soon after ginning of Kapas will not only keep down the cost of treatment and crop losses but will also improve the quality of harvests. The control of blackarm which is a disease of recent origin and which has assumed a major importance of late is being accomplished through selection for resistance by adopting the spray technique evolved by Dr. Knight in Sudan. The varieties given out for large scale propagation are being thoroughly tested first in pots by the Government Mycologist and later in field by secondary inoculation methods before release. The seed dressings with organo-mercurial compounds have proved their undoubted worth in controlling blackarm in Anglo-Egyptian Sudan. The adoption

of such pretreatments in so far as the American cotton seeds are concerned will stabilise the production, and quality of long staple cotton varieties of MU 1 and MU 2 class which are today the pride of India. There is an urgent need to organise and to develop effective control measures through pesticides, fungicides and fumigants in the state.

Seed Supply Short Term: Finance for seed multiplication work is now derived partly from subsidies granted by Indian Central Cotton Committee and partly from the State funds. The overhead charges on supervision and miscellaneous contingencies amounting to Rs. 5/- per bag of 100 lb. seed, has to be collected from the cotton farmer as premium for good seed if the schemes are to work on a self supporting basis. Majority of the farmers in the State are reluctant to pay the premium and as such the percentage of the growers who purchase the pure seed from the depots is low. The bulk of the sowing seed is supplied by private traders whose stocks are far inferior to the certified seeds. The defect can be remedied only when the growers themselves organise and develop the primary stocks of departmental seed by decentralising it on a village basis, leaving only the burden of supplying nucleus seed every year to the Agricultural Department. The other alternative will be to raise a separate pure seed fund by levying a small cess from the primary transactions of kapas and lint, sufficient to cover expenditure on seed production required for the whole area. It will not be possible unless the trade and the mill co-operate, and legislation is passed.

Marketing: The Madras Commercial Crops Markets Act has been recently amended so as to make it more efficient and to combine more than one commodity in markets where trade in crops other than cotton is in vogue. It will be possible eventually to open regulated markets in all important centres of the State. Such an expansion will instill confidence in the growers, avoid deliberate type mixtures and ensure maintenance of grade and purity. In the new areas, price guarantees and introduction of flat rates at all points with full and free facilities for transport will stimulate interest in cotton growing.

Legislation: The amendments incorporated in the Cotton Ginning and Pressing Factories Act (Madras) will effectively check the various malpractices of watering and mixing in the processing stages. The Madras Cotton Control Act aimed at the control off of variety of cotton grown in a zone and at prevention of

mixing in any stage, will further tighten up the measures taken towards maintenance of quality from the field stage. An Agricultural Seeds Act or a state check in all stages like Egypt will be very necessary for ensuring purity and grade, and for building up reputation in trade, internal as well as external. The provisions of the Cotton Transport Act have to be strictly applied especially in border zones by tightening vigilance on road and rail transport of seed and kapas. Otherwise the purity of the crop in the areas will be slowly undermined. A cotton certification scheme for MU 1 cotton has been working in Madras State from the year 1951. Under its provisions, all certified cotton is eligible for prices above the ceiling fixed for Cambodia and during the period of decontrol of prices, it will equally command a premium based on the ruling rates for East African styles. It is stated that the consuming mills are able to obtain good quality MU1 cotton since the introduction of the scheme.

Conclusion: In the forgoing paragraphs an outline of the various measures by which the raw cotton production could be increased without clashing with food programmes of the state was given. Unlike other states in India, Madras has varied crops, seasons and soils which would lend themselves admirably for large scale extension under mixed cropping, fallow cultivation and intensive farming. The cotton crop which can be grown throughout the year in most of the places has only to be fitted in any one of the three broad categories named above, through a proper choice of variety and planting time. Substantial increases in production on the existing area of cultivation can be achieved through a wider application of agronomic recommendations made in the paper. All of them have been tested not only on the Agricultural Research Stations but also on the cultivators' lands as part of the Cotton Extension Plans. The targets for production given in Statement III are based on average responses obtained during the last two years. Even on a very modest estimate of roping in only a portion of the ultimate potential area the extra annual production of American (long staple) and Deshi (short staple) cottons will amount to 5,32,000 bales and 1,18,000 bales respectively. India is importing large quantities of cotton in the staple length group $1\frac{1}{8}$ " to $1\frac{1}{2}$ " for spinning yarn of fine counts. The price structure of the imported medium long and extra long staple cottons is largely dependant on the future developments and requirements of fine spinning industries in the world and on the extent of competition from the synthetic

STATEMENT No. III.

Item No.	Particulars of extension work	Potential annual area over which the extension can be done	Estimated annual area over which the extension is proposed to be done	Anticipated average increase in lint	Extra annual production in terms of bales of lint (400 lbs.)	
					American Cotton	Deshi Cotton
		Acres	Acres	lb.		
1.	Utilisation of rice fallows in Cauvery, Kistna and Godavari deltas, tanked fed areas and other river projects where canal or underground water is available during summer ..	10,00,000	5,00,000	200	2,50,000	..
2.	Intensive cultivation and extension of cotton growing in new river projects viz. Tungabhadra Lower Bhavani and others under examination ..	5,00,000	2,00,000	200	1,00,000	..
3.	Application of fertilisers to existing area of irrigated Combadia Cotton ..	2,00,000	1,00,000	80	32,000	..
4.	Application of fertilisers to existing area of :—					
	(a) unirrigated Combadia ..	2,50,000	2,00,000	25	12,500	..
	(b) unirrigated Karunganni ..	4,50,000	3,00,000	20	..	15,000
5.	Mixed cropping of irrigated Combadia with <i>guava</i> ..	30,000	20,000	20	1,000	..
6.	Mixed cropping of irrigated Combadia with finger millet ..	2,50,000	1,00,000	100	25,000	..
7.	Close planting of irrigated MU 1 Cotton in early sown areas of Coimbatore District ..	30,000	20,000	20	1,000	..
8.	Early planting of irrigated MU 1 Cotton in South Arcot Dt. ..	3,000	2,000	100	500	..
9.	Development of perennials in homesteads, backyards and waste blocks :—					
	(a) South American types ..	..	..	..	15,000	..
	(b) Deshi-nadam ..	..	..	..	..	5,000

STATEMENT No. III—(Contd.)

Item No.	Particulars of extension work	Potential annual area over which the extension can be done	Estimated annual area over which the extension is proposed to be done	Anticipated average increase in lint	Extra annual production in terms of bales of lint 400 lbs.	
					American Cotton	Deshi Cotton
		Acres	Acres	lb.		
10.	Utilisation of interspaces in coconut gardens, <i>modan</i> fallows & <i>Kumari</i> lands of South Kanara and Malabar districts for growing Sea Island Cotton ..	5,30,000	2,00,000	100	50,000	..
11.	Mixed cropping with rainfed groundnuts :—					
	(a) American P. 216 F. and MU 1 ..	15,00,000	2,50,000	40	25,000	..
	(b) Deshi H. 420 & W. 1 ..	25,00,000	5,00,000	40	..	50,000
12.	Mixed cropping with rainfed chillies ..	2,00,000	1,00,000	40	..	10,000
13.	Mixed cropping of indigo with cereals in Tirunelveli, Ramenathapuram and Madurai Districts ..	3,50,000	2,00,000	8	..	4,000
14.	Early removal of jowar stubbles in rainfed black soils of Coimbatore and Tiruchirappalli Districts ..	80,000	40,000	10	..	4,000
15.	Reduction in crop loss due to pre-treatment with methyl bromide and organo-mercury compounds and control of other insects by pesticidal sprays or dusts on American Cotton ..	1,50,000	1,00,000	40	10,000	..
16.	Organisation of pure seed supply and application of Cotton Control Act over the whole area ..	16,00,000	16,00,000	5	5,000	15,000
17.	Improvements through breeding new varieties capable of higher yield, ginning percent, resistance to adverse factors, insects and diseases. This will include also introductions like P. 216 F., Luxmi and H. 420 from neighbouring States ..	16,00,000	16,00,000	5	5,000	16,000
				Total ..	5,32,000	1,18,000

fibres which are slowly taking the place of extra long staple in the manufacture of fine apparel goods, airplane fabrics, typewriter ribbons and other products. The breeding policy adopted in the State and outlined in the plan is aimed at stepping up the production of these styles through gradual replacement of medium staple American varieties. Extension of area in West Coast will increase the supply of extra long staple, while cultivation on rice fallows, under new river projects and as mixed cropping with finger millet will augment the medium long staple supplies. The implementation of the various ideas mentioned in the paper will require preparation of detailed districtwise plans and getting them executed under the district work programmes of the Department as well as the regional projects, if any, like Community Projects and National Extension Plan working in that area.

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ERRATA

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- Read Page 163. Line 15: Modus operandi for *Modes opurandi*.
 „ Page 183 heading: Bracts for *Brackets*.
 „ Para 2 line 1: Normal for *normol*.
 „ Para 2 line 8: Rachillae for *reachillae*.

Experiments on the Control of "Damping off" in Tobacco Nurseries

by

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Introduction: Tobacco is an important money crop in South India especially in the Madras and Andhra States. It is extensively cultivated in Nellore, Guntur, Krishna, West and East Godavari districts of Andhra State and occupies an area of more than one hundred thousand acres. Extensive areas of nurseries under the Virginian variety of tobacco are raised in the sandy belt from Bapatla to Kothapatnam (Coastal tract of the Guntur district) and in the black soil areas of Repalle, Guntur, Sattanapalle and Narasaraopet in the Guntur district to meet the requirements of seedlings for planting the above area. The chief limiting factor in the raising of nurseries was found to be the "damping off" disease of seedlings. This disease has been reported from most of the tobacco growing countries of the world. Several species of *Pythium* and *Rhizoctonia solani* have been shown to be associated with the "damping off" of seedlings. *P. aphanidermatum* (Eds.) Fitz. is the causal agent in India (Thomas 1943) and also in South Africa (Wager 1931, 1940), China (Yu 1934, Yu *et al* 1945), Gold Coast (Bunting and Dade 1924; Simond 1939). *P. aphanidermatum* has been found to be widely prevalent in all types of soils in the tobacco growing areas in the Madras State (undivided). Diseased seedlings collected from nurseries raised in sandy as well as black soil tracts in the important nursery areas showed the presence of *P. aphanidermatum*.

Various methods such as raised seed beds, sterilisation of seed beds, seed treatment and spraying have been successfully recommended by workers in other countries (Serbinow 1912). But as far as South India is concerned though these measures were advocated in some form or other definite experimental data were lacking. To find out therefore the most economic treatments for the effective control of 'damping off', experiments were laid out from the year 1943 onwards under a scheme of research sanctioned by the Government of Madras and the results of the experiments conducted during the years 1943 and 1944 are presented in this paper.

Materials and Methods: The experiments were laid out in two typical soil tracts viz., black soil area of the Agricultural Research Station, Guntur, representative of the area in which tobacco is grown

as a crop and in the sandy area at Bapatla representative of the sandy soils where by virtue of the better drainage conditions it is easier to raise nursery of tobacco seedlings with the result that a very successful nursery industry has developed, merely to supply seedlings to cultivators in the black soil area. The object of the experiment is to test the relative efficacy of various fungicides like a proprietary colloidal copper sold by Messrs. Boots Pure Drug Company, Calcutta, Bordeaux mixture and home made colloidal copper, as well as heat sterilisation of nursery beds and raising the level of the beds. Lay out: Split plot-randomized blocks; Replications-six.

Main treatments:

- A. Raised bed
- B. Non-raised bed

Subsidiary treatments:

- { Heat sterilized
- { Non-sterilized
- { Heat sterilized
- { Non-sterilized

Sub-plot treatments-3:

- (a) Bouisoi-1 ounce in one gallon of water.
- (b) Bordeaux mixture-1%.
- (c) Home made colloidal copper-3 pints of stock solution to 10 gallons of water.
- (d) Control (no spraying).

The area of each sub-plot was 6' x 3' and the total number of sub-plots was 96 with treatments randomized within the sub-plots. Three sprayings were given at fortnightly intervals beginning from the 21st day after sowing. Heat sterilization of the seed beds was done as follows. Dried chilli stalks to a height of about 9 inches were packed over the beds in the black soil area and burnt when the air was still. Dry casuarina twigs and sweepings from casuarina plantations were used in the sandy area. After complete burning the ashes were lightly raked and incorporated into the surface soil of the beds.

The nursery beds were sown with the seeds of the tobacco variety Harrison's special (H. S. 9) at the rate of one tola of seed (2/5 of an ounce) for each cent of seed bed area. Watering was done with a rose can at a uniform rate for all the beds. No covering was used for the nursery in the black soil. In the sandy area a mulch of *Tephrosia purpurea* was used to cover the seed beds for about two weeks from the date of sowing. The results of the experiments were evaluated on the basis of total number of surviving seedlings in the different treatments.

The experiment was repeated during the year 1944 with some alterations. As Bouisoi could not be procured on account of stoppage of imports due to war conditions, Burgundy mixture was substituted for Bouisoi. Further as the home made colloidal copper was found

ineffective at the strength used (3 pints to 10 gallons) the strength was increased so that the copper content is the same for all the spray treatments.

The sub-plot treatments were therefore, given as detailed below:

- (a) Bordeaux mixture (1%)
- (b) Burgundy mixture (1%)
- (c) Colloidal copper (1%)
- (d) Control

During the previous year only one set of experiments in the black soil and one in the sandy area was laid out. As there was no incidence of damping off in the black soil experimental plots, no information was available about the effect of the treatments under black soil conditions. This year, therefore, the experiments were laid out in each of these places in duplicate at intervals of about a month with the hope of getting disease at least in one series if not in both. In all other respects, the material and methods were similar to those given for the experiment conducted during the previous year.

Observations: The germination was quite satisfactory and the stand of seedlings uniform both in the black and sandy soil areas. The initial growth in the sterilized beds however was found to be much better than in the non-sterilized beds. In the 1943 experiments the first sign of 'damping off' was found in a few plots in a mild form and to a very limited extent 33 days after sowing in the black soil area. The subsequent spread of the disease also was quite negligible. Thus though the total area of the 96 experimental sub plots was 1728 sq. feet, the final extent of damage was found to be only 9.61 sq. feet equivalent to about half the extent of a single sub plot.

In the sandy area unlike the black soil area, the incidence of 'damping off' in the experimental beds was found to be very severe causing considerable damage in a number of beds. It was observed that seedlings in 30 out of the 96 beds were completely wiped out and ten others had a stand of only 2 to 26 seedlings. The data recorded were statistically analysed. As the treatment effects could not be properly evaluated on account of the negligible incidence of disease, in the black soil nursery this experiment was not taken into consideration. But in the sandy area, 'damping off' was present in a virulent form. Hence the data collected are of value in assessing the relative merits of the various treatments tried. The summary of results and conclusions are given in the table.

In the 1944 experiments there was very heavy incidence of 'damping off' in the experimental beds in the first series in the black soil area. The total number of surviving seedlings in the various treatments and replications were recorded and statistically analysed. The summary and conclusions are given in the table. In the second series in the black soil

area also there was very heavy incidence of disease. The disease appeared very early just after three weeks from sowing and when the first spraying was due to be given. The disease spread to a considerable extent in most of the control beds and many of these were completely wiped out in a few days. Some seeds hitherto lying dormant germinated later and produced a few seedlings. The total number of surviving seedlings were recorded and were statistically analysed. The summary and conclusions are given in the table.

Two series of experiments were also laid out in the same year in the sandy area with an interval of five weeks between the sowings. Though the first series here was also laid out at about the same time as in black soil, the incidence of 'damping off' was quite negligible. Hence the experiment was not taken into account in assessing the merits of the various treatments. In the second series however the incidence of 'damping off' was found to be very severe causing considerable damage to a number of beds. The results in terms of surviving seedlings were recorded under the various treatments. The data were statistically analysed and the summary of results and conclusions are given in the table.

Discussion and Conclusion: Of the six nursery experiments conducted in the years 1943 and 1944 in the black and sandy soils of the Guntur District two experiments have been rejected since the incidence of disease was negligible. The data of the remaining four experiments were analysed and the following conclusions were evident.

1. There is no significant difference between the level of beds in all the four sets of experiments.

2. Sterilization of beds is significantly superior to no sterilization in three out of four series.

3. Of the fungicides tried Bordeaux mixture 1% proved superior to Burgundy mixture in one experiment and in the other two it was on a par. Between Bordeaux mixture and colloidal copper the former proved superior to the later in all the experiments. In the one experiment conducted with the proprietary fungicide 'Buisol', Bordeaux mixture proved superior to it. Burgundy mixture was on a par with colloidal copper in one experiment and proved superior to it in two experiments. Colloidal copper proved inferior to Bordeaux mixture in all the experiments, inferior to Burgundy mixture in two experiments and was on a par with Burgundy mixture in one experiment and with Buisol in another. Both Bordeaux and Burgundy mixture proved superior to control in all the experiments while colloidal copper was superior to control in three experiments and was on a par in one experiment, where the copper content in the colloidal copper was less than 1%. Of the three fungicides Bordeaux mixture is to be preferred in view of its high efficacy.

Consolidated Summary of Results and Conclusions of the Experiments for the Control of 'Damping Off' of Tobacco Nurseries

		Mean number of surviving tobacco seedlings per sq. yd. of nursery bed					
Year and date of sowing		1943 (20-8-1943)	1944 (25-8-1944)	1944 (29-9-1944)	1944 (24-9-1944)		
Venue of experiment		Sandy area Bapatla	Black soil area, Agrl. Res. Station, Guntur	Black soil area, Agrl. Res. Station, Guntur	Sandy area Bapatla		
Treatments:							
Raised beds		66.00	231.15	140.34	142.61		
Non raised beds		98.80	208.38	158.80	209.60		
Critical difference		—	—	—	—		
Conclusions		Not significant	Not significant	Not significant	Not significant		
Sterilized beds		85.65	274.95	177.625	230.71		
Nonsterilized beds		79.10	162.59	121.525	121.89		
Critical difference		—	39.86 (5% level)	25.37 (5% level)	31.73 (5% level)		
—		—	56.89 (1% level)	36.09 (1% level)	59.79 (1% level)		
Conclusions		Not significant	Steriliza- tion	Steriliza- tion	Steriliza- tion	No steri- lization	No steri- lization
Bordeaux mixture (A)		176.25	294.5	191.77	209.25		
Burgundy mixture (B)		* 36.47	284.44	198.15	208.35		
Colloidal copper (C)		78.22	229.46	155.31	208.39		
Control (D)		38.45	66.69	53.06	22.30		
Critical difference		83.96 (5% level)	44.16 (5% level)	27.12 (5% level)	56.09 (5% level)		
—		113.39 (1% level)	58.73 (1% level)	36.06 (1% level)	89.01 (1% level)		
Conclusions		A C D B*	A B C D	B A C D	A C B D		

* Buisol

Therefore sterilizing the beds prior to sowing of the seeds and following it up with spraying preferably with Bordeaux mixture 1% seems to be the best way of combating the 'damping off' disease in the tobacco nurseries.

Summary: Experiments were conducted under randomised replicated split plot design for the control of damping off in the tobacco nurseries in the black and sandy soils in the Guntur District in the years 1943 and 1944. The results indicated that sterilizing the beds by burning chilli stalks in the black soil and casurina sweepings and twigs in the sandy soil and following it with spraying of the fungicides like Bordeaux mixture, Burgundy mixture or colloidal copper controlled the disease. Of the fungicides the former two proved superior to the latter.

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Improvement of the Quality of Fodder in Periamanjol Cholam (*Sorghum durra*) in Madras State

by

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Introduction: Periamanjol Cholam is the most important unirrigated variety of Sorghum grown in the Coimbatore district. It is grown in the taluks of Coimbatore, Palladam and also parts of Avanashi, Dharapuram and Erode and occupies an area of about a lakh of acres. Botanically, Periamanjol Cholam belongs to the species *Sorghum durra*, *vari Coimbatoricum* (Snowden). It has yellow grains and it is much valued as food. This variety grows very tall, attaining a height of 10 to 12 feet. The straw is the mainstay of cattle in this area. Sown in the months of July—August with the break of the south-west monsoon, it comes to harvest in December—January. The Tamil prefix "Peria" denotes the long duration (135 days) of this variety, distinguishing it from the "Chinna" Manjal Cholam which is a short duration variety grown under irrigation. In normal seasons, Periamanjol Cholam yields 600 to 800 lb. of grain and about 3,000 to 4,000 lb. of dry straw per acre. The straw is pithy, but sweet and nourishing. The problem of improving the fodder of Periamanjol by introducing juiciness into the straw was taken up at the Millet Breeding Station, Coimbatore, as an item in the improvement of the Sorghums of the Madras State.

Minerals and Methods: The varieties of Cholam grown in the State were studied in great detail to select a suitable parent with juicy straw for crossing with *Periamanjol Cholam*. In the ceded districts, (Madras, Deccan), there are a number of varieties with sweet and juicy stems which are very palatable and relished by cattle. Even rural folk in the Bellary and Kurnool districts are fond of chewing *Cholam* straw at the flowering stage. The "*Cheruku Patcha Jonna*" of Kurnool is thus a popular variety. Their yield of grain and straw is low when grown at Coimbatore. From the *Patcha Jonna* variety, a juicy stalked type A. S. 3355 (Co. 10) which showed minimum difference with A. S. 29 (Co. 1 *Periamanjol*) with regard to morphological characters was selected as a parent. The characters of the two parents are given below:—

Characters	Strain Co. 1 (<i>Periamanjol</i>)	Strain Co. 10 (<i>Patcha Jonna</i>)
1. Sheath colour	Blackish purple	Reddish purple
2. Midrib and juiciness	White (Pithy stalk)	Dull (Juicy stalk)
3. Panicles	Medium compact	Compact
4. Duration	135 days	155—160 days
5. Yield	600—800 lb.	300—400 lb.

Strain Co. 10 is of longer duration than *Periamanjol Cholam* its seed setting and grain yield are poor. The two types were crossed in the year 1939, and during subsequent generations, necessary selections were made to obtain pure breeding forms of *Periamanjol Cholam* with juicy stalks.

Results: All the hybrids had white midribs (pithy stalk) as white is a monogenic dominant to dull green (juicy stalk). In the F₂ and subsequent generations, segregations were obtained not only for midrib colour, but also for other minor characters like the leaf sheath colour in which the parents differed. Suitable selections were made from each generation, with a view to obtain pure breeding forms with all the desired characters including the juiciness of stem and high yield of grain like the standard strain Co. 1 of *Periamanjol Cholam*. Of the several selections under study, one selection under study, one selection A. S. 8112, was evolved in this manner. It has blackish purple sheath similar to the standard strain of *Periamanjol* and in addition has the juicy stem. It is shorter in duration than the parents and also has other desirable characters. It is also shorter in duration than the standard *Periamanjol Cholam* by 10 days. This selection was put to its first yield trial in the year 1948 along with Co. 1, the standard *Periamanjol Cholam* and also A. S. 8110 another selection of a parallel cross between *Periamanjol Cholam* and T. 12 (*Tellajonna* of Bellary). A. S. 8112 and A. S. 8110 have dull midrib (Juicy stalk) and yellow grain. The first yield trial was conducted in 1948 with Co. 1 as standard, and the data gathered during three years are presented below:—

Particulars	Selections			Whether differences are significant or not	Critical difference P—0.05
	Col. 1	A. S. 8110	A. S. 8112		
<i>1948 Yield Trial:</i>					
Grain yield as a % of the standard ...	100	122.9	120.8	No	
Straw yield as a % of the standard ...	100	93.1	111.3	No	
<i>1949 Yield Trial:</i>					
Grain yield as a % of the standard ...	100	57.1	107.1	Yes	13.7
Straw yield as a % of the standard ...	100	108.5	106.0	No	—
<i>1950 Yield Trial:</i>					
Grain yield as a % of the standard ...	100	126.2	113.1	Yes	20.2
Straw yield as a % of the standard ...	100	126.2	114.9	Yes	21.8

Discussion: It will be seen from the above data that selection A. S. 8112 has given as much yield of grain and straw as Co. 1, the standard *Periamanjol Cholam* strain with the added quality that it is juicy stalked and has greater fodder value. To assess the fodder value of this selection as compared to Co. 1, with regard to palatability, a feeding trial was conducted in January 1951. Two work animals were fed with 25 lb. of straw each, from each selection, and the quantity of straw consumed was recorded. The daily ration of 25 lb. of straw per animal was arrived at by previous tests with regard to the maximum quantity that a normal animal consumes. Owing to the severe borer attack on the *Cholam* crop in 1950—'51, the straw deteriorated and conclusive results could not be obtained in 1950—'51. It was repeated in the year 1952—'53.

Average quantity consumed

Animal No.	Co. 1	A. S. 8112
36	18.6 lb.	20.68 lb.
37	17.4 lb.	18.3 lb.

This shows that the selection, A. S. 8112 has better palatability compared to Co. 1 the standard strain. In addition to this, chemical analysis was done to assess the comparative nutritive value of the two types of straw. It is as follows:—

Strain Co. 1	Moisture	Ash	Crude protein	Ether Extractives	Crude fibre	Carbo-hydrate	Total	Lime (CaO)	Phosphoric acid
Co. 1	6.41	10.03	2.55	1.85	40.48	55.09	100	1.17	0.46
A. S. 8112	7.52	9.76	2.45	2.16	35.09	50.54	100	0.72	0.40

In the 1951 main season, separate plots were laid out to find out the yield of green fodder of the types and the juice content of their stems. The yield of green fodder obtained from A. S. 8112 is 20,000 lb. per acre whereas the yield of Co. 1 the standard strain of *Periamanjol cholam* was 18,000 lb. per acre. Just at the time of flowering, a weighed quantity of desheathed stalks in each of the above selections was crushed to determine the juice content. The extraction percentage of A. S. 8112 was 32 and of Co. 1 26. Regarding the quality of juice, A. S. 8112 has higher brix, and sucrose glucose values which are as shown below:—

Selection		Percentage on weight of juice		
		Brix	Sucrose	Glucose
Co. 1	...	12.5	2.51	5.29
A. S. 8112	...	14.4	5.20	5.25

Summary: *Periamanjol Cholam* of Coimbatore district is an important variety of dryland Cholam, occupying an area of one lakh of acres in the district. The stalks of this variety are pithy. With a view to improve the fodder quality of this variety by introducing juiciness into the stalk, it was crossed with a juicy stalked type of *Cholam* from the "Pacha Jonna" of the Deccan. From this cross, A. S. 8112, a pure breeding superior selection with juicy stalk has been evolved. Its grain and straw yields have been found to be equal to Co. 1 the standard strain, while the quality of straw is superior to that of Co. 1 as it is juicy and also sweet. Feeding trials show that A. S. 8112 has very good palatability. Further the analysis of juice revealed that A. S. 8112 has higher brix, and sucrose contents.

Acknowledgement: Our thanks are due to Sri M. A. Sankara Ayyar, B. A., B. Sc., (Ag.) who did the original cross. Our thanks are also due to Government Agricultural Chemist for the analysis of the straw samples.

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Research Note

Cytology of a Sterile Radish Plant

In the course of *Brassica Raphanus* hybridisation (Sabramanyam 1954), it was observed that in the pure line cultures of radish B. R. 11 (*Raphanus sativus*) one plant was not setting any pods. The reproductive parts were found to dry and fall-off in about 3-4 days of blooming as compared with the normal, where pod formation was characterised by the pistil remaining in position even when the petals withered away.

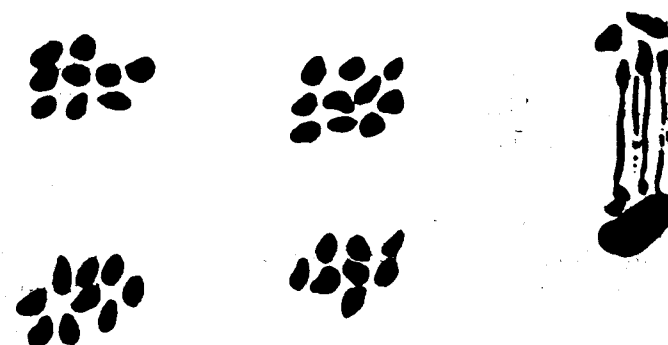


Fig 1

Fig 2

Fig 3

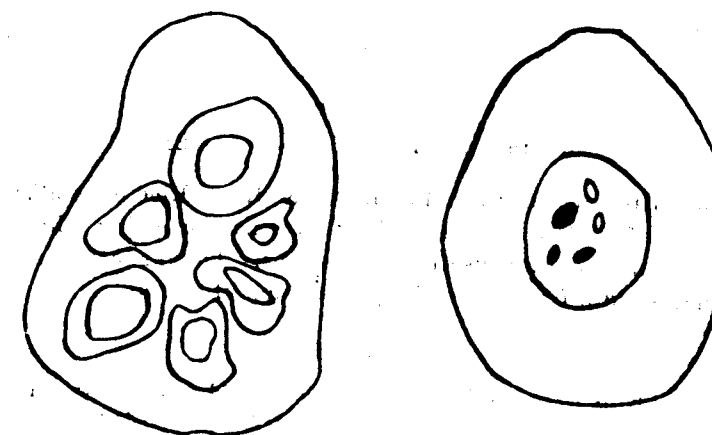


Fig 4

Fig 5

When the pistils of the abnormal plant, where there was no pod setting, was pollinated with fresh functional pollen from normal plants, it was not successful. Meiosis in the pollen mother cells was

studied from temporary aceto-carmin slides. The material was fixed in acetic alcohol (1 : 3) for three hours and preserved in 70% alcohol.

Chromosome counts made at different stages of division, showed 9 as the haploid number (Fig. 1). Great irregularities were noticed in the orientation of bivalents at the metaphase and in the distribution of chromosomes to the poles (Fig. 2). Fragmentation and lagging of bivalents was observed at anaphase I (Fig. 3). Distribution of chromosomes at anaphase was in the following order: Anaphase I (9-9; 8-10; 7-11; 6-12). Anaphase II (9-9, 9-9; 8-8, 10-10; 7-7, 11-11; 6-6, 12-12). 8-10 distribution was commoner than others (Fig. 2).

Aceto-Carmine smear preparations showed that pollen mother cells formed 2-6 cells (Fig. 4) in each pollen mother cell. Meiosis also occurred frequently (Fig. 5).

The data given below show that 4 is the most common number of cells per P. M. C. and the average per P. M. C. is 4.21. Giant and jointed pollen grain were also found. Pollen fertility was estimated to be 8.6% which, however, proved non-functional when pollinated to normal plants.

No. of cells per pollen mother cell.	Frequency	Total
1.	8	8
2.	33	66
3.	54	162
4.	169	676
5.	101	505
6.	73	438
Total	438	1,855
Average per P. M. C.		4.21

The writer wishes to thank Dr. S. K. Roy, Rice Specialist, Bihar for adequate facilities and Dr. U. N. Verma for going through the manuscripts and offering useful suggestions. Thanks are due also to Mr. M. Shamsuddin for help in the preparation of slides.

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Abstract

1. Extract from the Report of the Third Meeting of the Working Party on Fertilizer of the International Rice Commission, F. A. O., United Nations, 1963.

Rice is one of the most important food crops grown in the Indian Union. During the year 1949-'50, about 28 million hectares out of a total cultivated area of about 113 million hectares in the country had been under paddy cultivation. Paddy in India is mostly grown under rainfed conditions, especially in the eastern and southern parts of the country where the annual precipitation is at least 1,300 millimeters. About 30 percent of the rice lands have irrigation facilities through rivers, canals, wells and tanks.

The average yield of rice in India is about 800 kilograms per hectare, which is about one third of the Japanese average and half the Chinese average. The main problem facing the country is to increase the total production of rice, by (a) increasing the yield per acre by suitable manurial and cultural practices, (b) using improved and resistant varieties of seeds and (c) bringing under cultivation more of the area at present classed as cultivable waste through organised soil reclamation. Increased irrigational facilities for the existing and newly reclaimed lands are expected under the multipurpose river-valley projects undertaken by the Government under the Five-year Plan.

Location and extent of rice producing areas and their average yields: The major rice growing States in India are Assam, West Bengal, Bihar, Orissa, Madras, Mysore, Hyderabad, Travancore-Cochin, Bombay, Madhya Pradesh, and to a smaller extent the Punjab.

The total paddy area in different States, and the average yields are given in Table 1. Madras has the largest area (4.2 million hectares) under paddy and the average yield per hectare is also the highest (1,143 kilograms/hectare). Bihar has the next largest area with 3.8 million hectares under paddy, but the average yield is only 698 kilograms/hectare. West Bengal, Uttar Pradesh and Madhya Pradesh have 3.1, 2.9, and 2.4 million hectares of land under rice and their average yields per hectare are 943, 654 and 650 kilograms, respectively. Assam has about 1.5 million hectares under paddy and has an average yield of 865 kilograms per hectare. Only a quarter of the area under paddy in Bihar and one-fifth of the area in West Bengal and Madhya Pradesh have irrigation facilities.

TABLE 1

Area under paddy and average yields of rice in different States of India
(Average 1936-'46)

State	Area	Average yields
	Million hectares*	kg/ha.
Assam	1.5	865
Bihar	3.8	698
Bombay	0.8	990
Madhya Pradesh	2.4	650
East Punjab	0.2	669
Madras	4.2	1143
Orissa	2.1	672
West Bengal	3.1	943
Uttar Pradesh	2.9	654
Mysore	0.3	764

* One hectare = 2.47 acres.

While the average figures represent the average for each State as a whole, the average yields recorded at the state experimental stations are much higher than the average yield for the whole State, as will be seen from Table 2.

TABLE 2
Average rice yields of the state as a whole and of
Agricultural Experiment Stations

State	Average yield of state as a whole	Average yields at experiment stations
	Kg/ha	Kg/ha
Assam	865	1,842
Bihar	698	1,338
Bombay	990	2,396
Madras	1,143	2,270
Madhya Pradesh	650	1,372
Mysore	764	2,240
Orissa	672	2,186
Uttar Pradesh	654	1,290
West Bengal	943	2,340

This table indicates that the average yields per state are generally about half the yields recorded at the various state experimental stations. This suggests that the yields in the state as a whole can reasonably be doubled by adopting suitable manurial, rotational, and cultural practices.

One of the most disconcerting features of the yields of the rice crop in India has been a declining tendency in the average yields noticeable from year to year as shown in Table 3. The low content of organic matter, nitrogen, and phosphorus of Indian soils, the age-old intensive cultivation to which the soils have been subjected without proper replenishment, lack of proper irrigation facilities, and occasional vagaries of climate, all contribute toward lowering the productivity of the land.

TABLE 3
Average yields of rice in India

Year	Average yield
1895/96—1899/1900	1,056
1900/01—1904/1905	1,077
1905/06—1909/10	985
1910/11—1914/15	1,010
1915/16—1919/20	1,007
1920/21—1924/25	948
1925/26—1929/30	936
1930/31—1934/35	953
1935/36—1939/40	880
1940/41	761
1941/42	866
1942/43	883
1943/44	948
1944/45	842
1945/46	824
1946/49	—
1949/50	770
1950/51	667
1951/52	706

Response to application of Fertilizers on different soils: The following broad conclusions can be drawn with regard to likely manurial requirements of India under different soil and climatic conditions.

(a) In the black soil tracts, comprising Bombay, Madhya Pradesh, Hyderabad, and Central India, substantial response is obtained with ammonium sulphate under irrigated conditions. In unirrigated areas of the tract also, the response has been encouraging but this is likely to be affected by the amount of rainfall. The response is substantially increased, under both irrigated and unirrigated conditions, when phosphorus in the form of superphosphate is applied along with ammonium sulphate in the ratio of 2:1. A combination of inorganic and organic sources of nitrogen has proved more useful than either source alone.

(b) In the Gangetic alluvium comprising Bihar and Uttar Pradesh, positive response with ammonium sulphate has been obtained under irrigated conditions, which is substantially increased when supplemented with phosphates in the ratio of 1:1. Significant response under unirrigated conditions was obtained when combinations of nitrogen and phosphates were applied. Phosphates alone did not prove useful.

In Uttar Pradesh, universal response has been obtained with ammonium sulphate and other forms of nitrogen. The value of applications of phosphates alone or in combination with nitrogen has not been established.

(c) In the Indus alluvium, soils appear to be deficient, in the Punjab, in both nitrogen and phosphorus. While response to either of these alone is obtained under both irrigated and unirrigated conditions, combinations of nitrogen and phosphate have enhanced this response.

(d) Mixed red and black lateritic soils exist in Bengal, Orissa, Madras and Mysore. In West Bengal where the soils are mostly old alluvium and laterite, paddy responds to ammonium sulphate, but best results are obtained with ammophos, bonemeal, or nicophos where both nutrients nitrogen and phosphate, are present. In Madras and Mysore, where red, black and lateritic soils occur together with some deltaic areas, paddy responds well to ammonium sulphate. The effect of supplementary phosphate is not established. In Orissa (alluvial and lateritic soils), in general, a combination of nitrogen and phosphate appears to be necessary for obtaining increased yields of paddy.

Response to Different Fertilizers: In general nitrogen alone, either as ammonium sulphate or calcium cyanamide, has given a significant increase in the yield of paddy. A review of the past manurial experiments with paddy in India stresses the great need for the application of nitrogen in some form or other. The response to nitrogen is practically universal. Nitrogen at 22 kilograms/hectare (20 lb./acre) appears to be the minimum dose and it can be profitably increased to 67-80 kilograms/hectare (60-80 lb./acre), particularly when the average level of fertility is high.

Sulphate of ammonia finds the most universal application at the rate of 22-34 kilograms/hectare (20-30 lb./acre) of N. The response varies from 10-20 per cent over no manure, the average being 30-50 per cent. Cyanamide and nitrates of sodium and potassium have been used less frequently and the results indicate that they are not so good as sulphate of ammonia.

Indigenous oil cake, like that from groundnut, castor, beans, and mustard seed, has given significant increases in yields. Comparing oil cake and ammonium sulphate on the same nitrogen basis, there is definite indication that oil cake is as good as, or often better than ammonium sulphate. Experiments with mixtures of green manure, oil cake and ammonium sulphate indicate that a particular level

of nitrogen can more profitably be achieved by a combination of ammonium sulphate with green manure. Due to a generally lower humus content in tropical soils, it is usually recommended to apply inorganic fertilizers like ammonium sulphate in combination with bulky organic manures.

Response to phosphate alone: The most popular phosphatic fertilizer is superphosphate containing 15-40 percent water soluble P_2O_5 . Other forms of phosphates like phosphate nodules, rock phosphates and basic slag have not found much use due to their insoluble nature. Except in some cases, there is a low response to the application of phosphate alone to paddy.

The results from the application of phosphatic fertilizers are somewhat conflicting and wherever there is some response, the order is also low (8 percent increase in yield over control). Though most of the Indian soils are known to be very low in available phosphoric acid content, it appears that due to the low nitrogen content, single application of phosphates does not prove helpful to the plants. Generally when a response to phosphate is indicated, it occurs when phosphate is applied in combination with nitrogen, either as inorganic fertilizers or in the form of bulky organic manures.

Response to N. plus P. Combination: Nitrogen and phosphates in combination have been found to be useful and have been widely applied either as superphosphate mixed with any of the above nitrogenous fertilizers or as ammonium phosphates.

The doses of N. and P. vary according to their content in different fertilizers but it appears that N. plus P_2O_5 each at about 34 kilograms/hectare (30 lb./acre) is a very profitable dose.

On the lateritic soils of the coastal areas of Bombay, the application of bonemeal with nitrogenous fertilizer to provide N at 36-72 kilogram/hectare (32-64 lb./acre) gave positive responses. A linear response to increased doses of nitrogen was observed in these areas but for P_2O_5 the optimum was found to be about 72 kilograms/hectare (64 lb./acre) and P_2O_5 at 72-108 kilograms/hectare (64-96 lb./acre) gave positive responses. A linear response to increased doses of nitrogen was observed in these areas but for P_2O_5 the optimum was found to be about 72 kilograms/hectare (64 lb./acre).

Other combinations like that of N. plus K. and P. plus K. have failed to give any positive results. The complete fertilizer (N. plus P. plus K.) is not much used. Potash in general does not appear to play a significant role either alone or in combination with nitrogen or phosphorus.

Manuring practices and possible yield increases: Manuring is one of the chief factors that go to increase the crop yield. The possible yield increases in different states vary considerably and for applications of N. alone and N. plus P. the following increases can be generally expected in different States of India (Table 4).

TABLE 4
Possible yield increases from applications of N. alone and in combination with P. in different States of India

State	N.	N. plus P.
	kg./ha.	kg./ha.
Assam	120	295
Bihar	102	332
Bombay	222	305

	kg./ha.	kg./ha.
Madras	102	194
Madhya Pradesh	222	305
Mysore	157	303
Orissa	342	348
Uttar Pradesh	55	323
West Bengal	139	258
Average	162	286

Thus in India an increase of about 116 kilograms (255 lb.) in the yield of paddy is generally obtainable by combined application of nitrogen and phosphate, nitrogen being applied partly in the organic and partly in inorganic form. Most of the experiments have shown that combined applications of organics and inorganics have generally given better response than either one singly.

Extent to which Recommended Practices Are Used: At present in India, only a small fraction of the total area is having the benefit of manures and fertilizers. The indigenous manures are inadequate and the use of fertilizers has not been widely adopted. The main handicaps to the more extensive use of fertilizers are the very limited economic resources of the cultivator and his ignorance regarding the beneficial effects of the application of fertilizers. In order to stimulate low production through increased fertilizer usage, the cultivator's requirements of cheap credit must be adequately provided for. Additional stimulus to fertilizer consumption can also be given by subsidy programs, where the alteration of an unfavourable cost benefit ratio is necessary. An extension of the demonstration and propaganda field tests would also be of great importance, as would the provision of supplies of fertilizer for demonstration by the cultivators.

Under the five year plan, the consumption of nitrogen and phosphatic fertilizers, namely ammonium sulphate and superphosphate, is expected to increase year after year, this increase in consumption is only possible if sufficient attention is paid to demonstration combined with propaganda. Side by side with increased consumption, it will be necessary to make provision for meeting the demand for increased supplies, and the desirability of expansion of production must be considered.

Investigational Work Planned to Evaluate Soil Fertility Conditions as a Basis for Making Manurial Recommendations: On the recommendations of A. B. Stewart, the Indian Council of Agricultural Research has sanctioned in several states a scheme of simple trials on the fields of cultivators with known fertilizers with the double object of (a) determining the fertilizer needs of soils and finding the average response to a particular manurial supplement, and (b) enabling the scientists to study the interaction of this response with the local variations within the tract. This information will form the basis for making practical recommendations applicable to specific conditions.

In addition to the above experiments, under the United States Technical Co-operation Administration Program, statistically laidout agronomic trials have been started from Kharif 1953 in 15 paddy centres throughout India with new fertilizers: urea, nitrophosphate, ammonium phosphate, double superphosphate and ammonium sulphate. The object of these experiments is to determine by actual field tests the response of crops to the application of new fertilizers under the different soil and climatic conditions in different parts of the country.

Furthermore, in order to make the farmers fertilizer-minded and to popularise the use of new fertilizers in the country, it is planned to have cultivators lay out trials as extensively as possible, with new fertilizers, so that they will be convinced of the performance of these fertilizers. About 10,000 trials are being planned under this scheme.

[A. M. K.]

2. *Studies on Neyveli lignite, Palaniappan, N. P., Murthy B. S., J. of Annamalai University. XIX P. 166. 1954*

This gives the systematic investigation of the limits of usefulness of lignite as a source of producer gas. Two aspects have been studied. (1) The inherent qualities of lignite and its char justifying its use for the said purpose. (2) the constructional details of a plant that could utilise to the maximum the available essential fuel qualities of this indigenous lignite. Information regarding first aspect got by analysing the lignite and its char. 7 samples from bore holes of different depths analysed. Analysis conducted as per Fuel Res. Publication No. 44. H. M. Stationary Officer. Calorific value using Parr oxygen calorimeter. Analysis show that on air dry basis the average composition is moisture 10.25%. Volatiles 48.31%. Fixed carbon 36.75% ash 4.39% sulphur 1.41% Cal. value 9,300 B. T. U./lb. and is suitable for producer gas production. [A. M. K. and S. V.]

3. *Notes on Lychee Grafting. By Roy O. Nelson. Florida Sub-Tropical Gardener. Vol. 3. Page, 13 and 30. February 1955*

Budding and grafting trials at the University of Miami Experimental farm on seedling lychees $\frac{1}{2}$ inches in diameter, using chip buds, shield buds, and veneer grafts have given successful "takes" and subsequent springing of buds. These grafted trees, now 14 months from grafting, average $\frac{1}{2}$ inches in diameter and 24 inches in height. Proper selection of graftwood appears to be of more importance than either the method of grafting or the condition of the stock in the success of the operation. The parent trees from which the graftwood was selected had been forced into a condition of vigorous growth by ample quantities of fertiliser and water. The methods of graftage used were the conventional shield bud, chip buds, and side veneer grafts. Also used was a slight modification of the eye bud cut in a manner similar to that used in guava graftage. This type of scion cut has an advantage over the methods in that the bud eye may be wrapped in a manner so that a slight opening can be left at the top of the wrap. This will enable the bud to emerge before the wrap is removed. Vinyl plastic film .0035 inch thickness cut in $\frac{1}{2}$ inch wide strips were used for wrapping the buds in a shingle-like manner wrapping upward and finishing the wrap by under-lapping the end of the film as is done when using a rubber grafting strip. The lychee, being slower in growth habits than the citrus, should not be lopped over until one month after the graftage operation.

ORTHOCIDE 75 Seed Protectant is a new organic chemical (N. Trichloromethylmercapto-4-cyclohexene-1,2-dicarboximide). It has been tested and used as a seed protectant on a wide variety of seeds in all kinds of soils, weather and temperature conditions. It has proven to be very effective protecting seeds against seed and seedling rots. [N. V. S.]

Gleanings

Renovation of Citrus Trees: Citrus trees tend to lose vigour as they grow older. This condition is not always confined to old trees and can occur at varying ages as a result of any of several causes:—

- Root Rot;
- Defective underground drainage;
- Virus diseases;
- Inadequate or unsuitable fertiliser;
- Poor cultural practice;
- Loss of surface soil;
- Faulty irrigation method;
- Difficulty in meeting the needs of aged trees for plant food and moisture;
- Trace element deficiencies and
- Insect pests.

Root Rot: Trees affected by phytophthora root rot, a disease responsible for citrus tree decline to a greater extent than any other single cause, are not good subjects for renovation.

This disease attacks trees on the susceptible rough lemon (citronelle) and sweet orange rootstocks, but trifoliata rootstock is highly resistant. Citrus tree decline resulting from attack by this disease can be satisfactorily dealt with only by removal of infected trees and replacement with trees on the resistant trifoliata rootstock. Preferably draining should precede planting.

Defective Drainage: Citrus trees thrive best on soils that are naturally well drained. It does happen that land with fair drainage in only normal seasons has to be included in a planting programme. Land of this type presents serious problems in wet seasons or under irrigation. The soil becomes water-logged for periods in wet seasons or water tables may develop under irrigation, due to the presence of an impermeable subsoil. Underground drainage installed at the outset in land of this type can avert serious damage to the trees. Many instances can be quoted of mature thriving orchards on land of this type virtually collapsing in the summer following a wet season as a result of root damage sustained in the water-logged soil. Usually phytophthora root rot will be found associated with conditions of poor drainage if the trees are on susceptible rootstocks. Phytophthora resistant rootstocks are not the complete answer to faulty drainage, and best results will not be achieved if the soil becomes waterlogged for even short periods of time, irrespective of the rootstock used.

Virus Diseases: From about the seventh year onwards the trees become less vigorous, fruit size suffers, and increased applications of manure have no effect. The cause of this condition has been determined as a virus disease which produces the symptoms of unthriftness in association with rough lemon rootstock. Solution of the problem lies in propagating these varieties on the tolerant sweet orange or trifoliata stocks. Affected trees on rough lemon cannot be rejuvenated and replacement is necessary.

Scaly Butt: Another virus disease resulting in severe stunting is that producing the scaly butt symptom on the stock portion of the tree when the stock is trifoliata. Trees stunted by this disease cannot be improved by any known treatment. Correction lies in removing trees as soon as the stunting symptom is recognised and replacing with trees propagated from scaly-butt-free parents.

Stem Pit: Affecting grapefruit chiefly, the stem pit virus reduces tree vigour and the fruit becomes small with an abnormally thick rind. Trees showing symptoms of the disease do not respond to treatment and solution of the problem is to remove the trees.

Shell Bark: This disease, also a virus, affects lemons, and symptoms show as gumming on the trunk above the bud union, and, at times, extending into the main branches.

This disease is often confused with collar rot which also kills the bark on the trunk. Drought effects intensify the symptoms and treatment should include adequate irrigation during dry weather. This, together with ample applications of fertiliser, will keep the trees in commercial production up to the age of 20 to 25 years, when consideration should be given to their replacement.

Scorosis or Scaly Bark: This is another virus disease responsible for a decline in tree vigour. This disease is usually transmitted in the buds, which emphasises the necessity for certified parent trees as a source of bud supply. There is no treatment effective in restoring infected trees to full health.

Manuring: Loss of vigour is easiest to correct when it is the result of inadequate or faulty manuring. Citrus trees require the basic plant foods, nitrogen, phosphoric acid and potash, for satisfactory growth. Some soils are supplied with potash in sufficient amount, but many other citrus soils are lacking in all trees. Therefore, the use of mixed fertilisers is favoured in many districts.

Nitrogen: Citrus trees require relatively large quantities of nitrogen. Insufficient nitrogen is quickly indicated by yellow leaves and poor growth. The nitrogen requirements of citrus trees may be as high as 2 lb. actual nitrogen per tree per annum. Only large trees would require this amount, but 1 lb. to 1½ lb. is required by trees of average size. The availability of nitrogen to the trees following application varies according to the material used (assuming soil moisture is present) from immediately in the case of nitrate of soda to a few weeks in the case of sulphate of ammonia and rather more slowly in the case of castor meal and other fertilisers. Weeds or cover crops provide a good guide to nitrogen requirements. If they are poor in colour and growth then nitrogen is likely to be in short supply.

Phosphates: Phosphoric acid is essential to citrus tree nutrition, though immediate or observable benefits seldom follow its use. However, when phosphoric acid is inadequate trees tend towards heavy spring leaf-fall, some terminal leaf browning may occur, and the fruit will show a rind coarseness with a tendency to open centres. When mixed fertilisers are used, or when liberal applications of phosphate (2 to 5 cwt. per acre) are made to green-manure crops, the phosphate requirement is adequately met in most soils.

Potash: While essential to trees and plants, the application of potash, unlike nitrogen, produces no spectacular result. Most loam and clay soils do not seem to benefit from its use and plants appear to be able to secure sufficient when grown in soils of these types.

Fertiliser should be applied to citrus trees generally before the beginning of spring growth and in time for the plant foods supplied to become available. A second application towards the end of summer helps to promote a good autumn growth. Where circumstances permit, light and frequent applications offer an advantage over heavier, infrequent dressings.

Conditioning: Citrus trees to be severely pruned as part of the renovation treatment, should be given an adequate fertiliser dressing sometime beforehand.

The root system of citrus trees can be extensive but, in the majority of cases, and almost invariably in the case of trees requiring renovation, a large proportion of the fibre roots will be found under the limb spread. This makes the placement of a proportion of the fertiliser to the area under the tree worth while. Land which has been cultivated for a long time tends to become deficient in organic matter and this is to be replaced. Correction becomes necessary and this may be accomplished by the application of organic manures or the use of cover crops. Organic manures—cow, horse, sheep, and poultry—may be applied at rates ranging from 5 to 8 tons per acre for cow manure down to 2½ tons in the case of poultry manure. Unfortunately, supplies of organic manures are not usually available in the quantities required.

Lime: Benefit can be derived from the use of agricultural lime in highly acid soils, such as occur in many parts of the high-rainfall districts, or in soils that have been acidified by continual applications of sulphate of ammonia (either by itself or in fertiliser mixtures). In most cases where acid soils occur it is common to find the trees suffering in varying degrees from magnesium deficiency. It is good practice, therefore, to apply dolomite lime rather than carbonate of lime (agricultural lime). Dolomite contains magnesium and assists in correcting the deficiency, while the lime content corrects the acidity problem.

Cultural Practices: The old custom, now largely discarded, of frequent cultivation in the belief this was necessary to retain moisture in the soil, is harmful in the long run because of its effect in breaking down soil structure and hastening the loss of organic matter. Some cultivation is necessary in the great majority of cases, but this should be no more than the minimum necessary to keep competing weed growth in check during the drier months of the year. The only exception to this rule is when an undesirable grass or weed appears and its eradication makes more frequent cultivation necessary for a period. Depth of cultivation is important, particularly when it is realised that a large proportion of the citrus tree's root system is within the top 12 inches, in deep soils, and, in shallow soils may not be deeper than 8 or 9 inches. Consequently, cultivation should be as shallow as possible, consistent with effective weed control.

Irrigation: The ideal in irrigation is to maintain sufficient soil moisture in the root zone of trees, avoid over-wetting the land and, at the same time, ensure that all trees receive enough for their requirements.

Plant Needs: Difficulty in meeting the moisture and food requirements of the trees is sometimes seen in the coastal districts, where the soil is shallow. It occurs only in the older plantings where tree development has been good during the earlier years and when the seasons were favourable. This condition is readily corrected by a programme involving severe pruning in the late winter or early spring. Preparation before pruning, in the shape of a liberal application of fertiliser is necessary, and this, applied early in the winter and followed by effective weed control, puts the trees into a condition where a rapid response to pruning can be expected.

Pruning: The pruning method used will vary slightly between varieties. In the case of oranges and lemons all minor branches are first removed, leaving the main frame of larger limbs. Next remove all limbs tending to a vertical position at their base, retaining, where possible, the limbs tending to a horizontal position. Then cut the limbs retained at a point where the limb diameter is ½ inch to 1 inch. Some flexibility must be used in deciding where to make the terminal cut, as all trees do not necessarily make uniform growth on all sides. It is, then, sometimes necessary to retain a weaker limb than is desirable to fill

a weak quarter. The terminal cutting will be carried out so that a reasonable general confirmation of the tree is obtained. No growth-carrying foliage is allowed to remain. Even young shoots of reasonable vigour should be removed, except in the case of mandarin varieties, when the limbs or twigs forming the skirt or lower branches of the tree should not be pruned at all. Treatment of the rest of the tree will follow similar lines to that described for oranges, except that the vertical growth habit of some mandarin varieties will prevent the horizontal trend being achieved to the same degree. Serious die-back may occur from the terminal cuts if all foliage is removed in the manner employed for oranges and lemons.

After Treatment: In coastal districts it is good practice to spray, immediately after pruning, with lime sulphur at a strength of 1 in 12. This spray is designed to control white louse scale and kill any moss or lichen. If the weevil known as "Dicky Rice" is prevalent then the DDT spray at 0.1 per cent., applied twenty-one days after pruning, will effectively control this pest which, if not checked, can prevent limbs or whole trees from breaking into new growth. DDT sprays are not advisable at later stages, because of the danger of a heavy infestation of red scale, which often appears after this material is used. If Dicky Rice activity occurs after new growth has appeared the spray should be confined to the lower limbs and trunks, and not applied to the rest of the tree.

Thinning: A large number of new shoots appear some three or four weeks after pruning. These usually extend only 8 to 12 inches before maturing. Shortly after this stage a second growth is made by a percentage of the earlier shoots. This growth is vigorous and may extend 3 to 4 feet length. At this stage a temptation to thin out the new growth should be resisted. The trees need all the leaf surface possible at this stage. Also, the shoots which fail to make vigorous extension growth will, if allowed to remain, produce a crop of fruit much sooner than the stronger growths. Thinning is better left until the weaker shoots commence to die as a result of excessive shading. If necessary, skeleton pruning may be repeated several times. Usually it is not necessary to repeat more often than every five or six years. Pruning of this nature results in the loss of one crop and production commences again in the second year. However, there are times when it may be deferred for another year.

Minor Elements: In addition to the major plant foods—nitrogen, phosphoric acid and potash—trees require small quantities of what are termed "minor elements". Some of these are needed in extremely small amounts but, when the supply is inadequate, tree growth is restricted, sometimes to the point of causing the trees to die back. Deficiencies most common in citrus are copper, zinc, magnesium and manganese. Less commonly encountered are deficiencies in iron, calcium and boron. Copper, zinc and magnesium deficiencies can restrict growth very considerably, but manganese deficiency has to be severe before growth is materially affected. It will be evident that trees suffering from deficiency complaints must first be treated for the deficiency concerned before restoration to health can be expected.

Insect Pests: Tree condition can be adversely affected by insect attack, even to the point where limbs, and at times the trees, are killed. Pests, which can be classed as severely damaging to tree health are red scale, purple scale, and white louse scale. These scales are often responsible for considerable limb die-back and red scale has been known to kill young trees outright. White louse is seldom a pest on young trees but can be the cause of limb die-back in older trees. Other scale insects, such as brown scale, soft brown scale, and white wax scale, can restrict growth but are rarely responsible for the death of twigs. Bronze

orange bug can cause partial defoliation and loss of vigour in trees when the bugs occur in sufficient numbers. Both bronze orange bug and crusader bug cause considerable die-back of young shoots with a consequent stunting effect on tree development. Tree recovery cannot be expected until the pests are controlled. Fruit tree root weevil, attacking the roots of citrus trees in its larval stage, causes a marked loss of vitality in the trees infested. Growth diminishes, foliage becomes sparse and of small size, and fruit production declines. This weevil feeds on the foliage as an adult but damage of this nature is usually so slight as to pass un-noticed and the first obvious indication of presence of this pest is in the other wise inexplicable loss of vigour in the trees. The weevil favours the heavier type soils and is seldom seen on the lighter sandy soils. It is usually at its worst in the deeper soils. It is highly desirable that this weevil be recognised in the early stages, preferably before the tree's condition indicates its presence. Consequently, a watch for adult weevils on the trees during the spring and summer should be maintained and, if found, specimens forwarded to the Department of Agriculture for identification and advice on control. Dicky Rice weevil is very much smaller than its relative, the fruit tree root weevil, and is often overlooked, but the effect on the trees and fruit is quite obvious.

In this case it is the adult weevil which is responsible for restricting growth by feeding on the shoots as they emerge from the buds. This damage can proceed to point where growth is entirely prevented. It will feed on the margin of more mature leaves giving them a fringed effect. It also feeds on the young developing fruits, producing white mark on the rind which later turn dark to form a blemish which lowers the appearance and value of the fruit. This weevil can prevent new growth appearing on either part or the whole of a tree which has been skeleton pruned. Being nocturnal in habit and quite small, it is often difficult to find specimens of this weevil but the damage to foliage, fruit and new shoots is so characteristic that these symptoms are usually sufficient to determine its presence. Fuller's rose weevil is another of the weevil group. Midway in size between the Dicky Rice weevil and the large fruit tree root weevil, this adult feeds on the foliage quite freely, and, confining its feeding chiefly to the leaf margins, gives them a scalloped appearance as distinct from the fringed effect produced by the smaller Dicky Rice. Nocturnal in habit, feeding is concentrated on the lower branches at first and the damage to the leaves is the obvious sign that the pest is present. Citrus Bud Mite, attacking the growth buds before new growth begins, is the cause of distortion which interferes with normal shoot development. Trees heavily infested become so seriously distorted in the growth terminals that skeleton pruning (described elsewhere in this article) is justified. This, followed by spraying, enables the trees to make a fresh start with normal growth. It is the damage to embryo fruits by this mite which results in the grotesque shapes sometimes seen in lemon fruits and, much less frequently, in oranges. Usually fruits and thus escape notice, but the occasional specimen which remains to maturity cannot escape attention. So, in addition to deforming and checking growth, this pest can also be responsible for a reduction in the crop.

(Australian Agri. Newsletter No. 470) [A. M. K.]

Cotton in rice fallows. Does it impair soil fertility? Growing of cotton in the rice fallows in the districts of Tanjore, Tiruchirapalli and South Arcot is coming into vogue and gaining popularity among the ryots. It is estimated that in the coming season over 10,000 acres will be sown to cotton in places where irrigation facility exists. However, it may be argued that the fertility of the soils may be depleted to the detriment of the succeeding paddy crop by adopting this practice of raising cotton in rice fallows. This point was not lost sight of and actual soil analyses were carried out both before and after dropping to ascertain

the actual state of affairs. Soil samples were drawn, both from the fallow and from where cotton was raised at three different depths, namely, 0-6", 6-12" and 12-24" at a number of places in three districts, where these trials are in progress. The samples were examined for the essential plant nutrient contents nitrogen and phosphoric acid. The results of such analyses reveal that there is some slight depletion of nitrogen in both the cotton and the fallow fields at the end of the cotton season. The depletion of nitrogen is however, greater in the fields where cotton is grown. This reduction in the nitrogen content is noticed mainly in the deeper layers of soil while there is not much difference in the surface soil. This point is conceivable as the cotton plant has a deeper root system and is able to obtain its nutrient requirements from the lower layers. Even the little removal of nitrogen in the surface samples by the crop in its early growth stages is made good to some extent by the leaves shed by the crop. The slight depletion in the nitrogen content in the top soil is not of much significance to affect the yield of the succeeding paddy crop which can be easily raised with the incorporation of green manure and ammonium sulphate as is the practice everywhere. Regarding the available phosphorus, it is seen that there is no loss generally in all places and, in fact, in most instances, there is more of available phosphates left behind after a crop of cotton. Thus it is clear that cotton growing in the rice fallows is not detrimental to the paddy crop that follows it, provided adequate manuring with green leaves and ammonium sulphate, is resorted to as per usual practice in these areas. The above note is based only on the data collected in 1954.

(D. A's. Agri. News. Letter June 1955). [A. M. K.]

Successful Candidates in the B. Sc. (Ag.) Degree Final Examination held in April, 1955 by the University of Madras

Abdul Latiff, A., Abdul Samad, N. M., Achutha Kurup, K., Alagappan, R. M., Alfred, J. M., Andrade, F. O. C., Andrew Desabanthu Devotta, Arunachalam, M., Arunachalam, V. G., Balakrishnan, C., Balasubramanian, V. P., Chellappa, K. K., Chinnaswami, M., Dharmaraj Moses, J., Dinakaran, M., Doraiswami, M., D'Souza, S., Gangadhar Varman, V. N., George, A. J., Govindan, K., Govindarajan, M., Gunachandran, P. N., Gunaseelan, L. M., Indran, M., Iruthaya Raj, M. R., Jose, P. C., Kadambayanasundaram, M., Kannan, S., Karunakar Shetti, B., Kolandayappan, K. A., Krishnama Raju, A., Kumaran, V., Madhavan, O. T., Meenakshisundaram, V., Mohd. Abdul Khader, J. B. M., Mohd. Asam, C. A., Mohd. Ghouse, I., Muthiah M., Narayanan, B. L., Narayanan, P. K., Natarajan, V. R., Panchapakesan, V., Periaswami, M., Periaswami, N. K., Picardo, W. I. M., Ponnuswami, S. V., Poonacha, B. A., Premnath Alwa, M., Prince, S., Radhakrishnan, S. A., Ramachandran, C., Ramachandran, S., Ramiah, S., Samraj Daniel, J. C., Samuel, T. V., Sankaran, S., Sasibhushana Menon, M., Sekkappan, S., Sellanna Goundan, V. R., Shanmugavelu, K. G., Shivarama Rai, P., Soundirarajan, V. V., Sriram, T. A., Bernard, S. F., Subramaniam, S. (Sundaram), Subramanian, S. (Swaminathan), Subramanian, T. L., Sundaravaradan, S., Thanikachalam, T., Thyagarajan, N., Thyagaraj, R. S. T., William Odongo Omamo, Xavier, T., Seemanthini, B., Sukanya Bai, M. V., Antony, C. R., Kanakasabapathy, T., Munuswami, A., Premnandan, P. P., Rajendran, G. K., Ramadas, N., Ramakrishnan, O., Ranganath Prabhu, K., Ravindranatha Menon, C., Sadagopan, V., Srinivasan, V., Swaminathan, R., Thulasi Rao, N.

Weather Review — For the month of May, 1955.

RAINFALL DATA (IN INCHES)

Division	Station	Total rainfall for the month	Departure from normal	Total since 1st January	Division	Station	Total rainfall for the month	Departure from normal	Total since 1st January
North	Madras (Meenam-bakkam)	6.2	+ 5.2	12.8	South	Madurai	2.9	+ 0.2	8.0
	Tirur-kuppam*	6.1	+ 3.8	12.6		Pamban	0.8	- 0.4	13.7
	Vellore	7.6	+ 5.3	10.0		Koilkatti*	0.7	- 2.3	8.7
	Gudiyatham*	4.0	+ 1.7	6.4		Palayam-cottai	0.3	- 1.3	9.3
East Coast	Palur*	14.9	+ 10.5	22.3	West Coast	Amba-samudram*	2.7	+ 1.1	14.0
	Tindivanam*	6.9	+ 5.7	9.8		Trivandrum	17.3	+ 8.5	23.1
	Cuddalore	15.3	+ 14.3	20.8		Fort Cochin	29.0	+ 17.3	37.1
	Naga-pattinam	5.7	+ 4.1	13.9		Pattambi*	17.3	+ 11.6	22.5
	Aduturai*	9.7	+ 8.0	15.5		Kozhikode	28.6	+ 19.7	36.4
	Pattukottai*	2.3	+ 1.1	8.2		Taliparamba*	30.0	+ 24.4	31.7
Central	Salem	6.7	+ 2.1	11.1	Hills	Wynaad*	17.2	+ 1.8	26.5
	Coimbatore (A. M. O.)*	4.7	+ 2.4	8.0		Nileshwar*	29.6	+ 23.9	32.6
	Coimbatore	5.4	+ 2.9	10.4		Pilicode*	32.1	+ 26.9	35.0
	Tiruchirappalli	5.8	+ 3.2	10.9		Mangalore	14.9	+ 7.2	15.8
						Kankanady*	14.6	+ 9.4	15.8
						Kodaikanal	9.1	+ 2.7	27.5
						Coonor*	4.5	+ 1.0	16.5
						Ootacamund*	20.4	+ 13.8	27.8
						Nanjnad*	16.9	+ 11.5	22.5

Note:— * Meteorological Stations of the Madras Agric. Dept.

The month began with localised thunder showers in Malabar and South Kanara districts. Weather became disturbed in the south west Bay of Bengal on 2-5-1955. Till 5-5-1955 rains were fairly widespread along the West Coast and light and local in Tamilnad. About 200 miles south-east of Masulipatnam a depression was noted at 08-30 hours I. S. T. on 6-5-1955. On the next day, it intensified into a cyclonic storm and moved north-west and finally became feeble on the third day. Fairly widespread showers were received at a few places in Tamilnad on 8-5-1955. In the succeeding eight days there were no large changes in weather conditions.

On 17-5-1955 a depression was noted about 250 miles to the east of Cuddalore. Associated with it widespread and locally heavy rain fell in Tamilnad and also in the districts of Malabar and South Kanara. It crossed coast between Cuddalore and Madras and was centred some 30 miles inland on 18-5-1955, on which day heavy rains were received in the region. On the third day, it became a diffused low pressure area extending from west Tamilnad to south Deccan. During the period 20-5-1955 to 25-5-1955 only the west coast districts received rains. On 26-5-1955 weather became mainly dry over the region. Rains were fairly widespread in Malabar and South Kanara and light and scattered at a few stations in Tamilnad on 27-5-1955. The very next day a trough of low pressure was noted in the Arabian Sea off the Malabar-Kanara coast and a temporary advance of the monsoon also took place on the same day. Within two days the monsoon became active in the West Coast and remained so, till the end of the month.

The note-worthy rainfalls and the zonal rainfall in inches are furnished hereunder:—

Note-worthy Rainfalls			Zonal Rainfall			
Date	Name of Place	Rain-fall	Name of Zone	Average rainfall for May, 1955	Departure from normal	Remarks
10/5/55	Tiruchirapalli	3.0	North	6.0	+ 4.0	Above normal
12/5/55	Alleppey	4.1				
17/5/55	Madras (Meenambakkam)	4.0	East Coast	9.1	+ 7.3	"
18/5/55	Madras (Nungambakkam)	3.0	Central	5.7	+ 2.7	"
18/5/55	Cuddalore	9.0	South	1.4	— 0.5	Below normal
"	Salem	8.0				
19/5/55	Ootacamund	7.0	West Coast	23.1	+ 15.0	Above normal
"	Kozhikode	6.0				
"	Fort Cochin	6.0				
21/5/55	Palghat	5.0	Hills	12.7	+ 7.3	do.
30/5/55	Mangalore	3.0				

Agricultural Meteorology Section,
Lawley Road P. O.,
Coimbatore, 7-6-1955.

C. B. M. & M. V. J.

Departmental Notification

Gazetted Service — Postings and Transfers

Name and present post	Posted as
Bhavani Shanker Rao, Paddy Specialist, Coimbatore,	Millets and Pulses Specialist, Coimbatore.
Gopalan Nair, T., Banana Res. Officer, A. D. T.,	Horticulturist and Prof. of Horticulture, Coimbatore.
Kuppuswami, B. S., Asst. in Fruits, Coimbatore,	Asst. Fruit Specialist, Coonoor.
Kanakaraj David, S., Lecturer in Ento. Coimbatore,	Crop and P. P. O., Ento., Coimbatore.
M. Basheer, Crop and P. P. O., Coimbatore,	Lecturer in Entomology, Coimbatore.
Samuel Sundararaj, J. Asst. Fruit Specialist, Coonoor,	Banana Research Officer, A. D. T.
Venkatakrishnan, G., Principal, Basic Training School, A. D. T.	D. A. O., Salem.

Upper Subordinates — Postings and Transfers

Name and present post	Posted as
Athmaraman, P. S., S. D. A., Pattukottai,	P. A. to D. A. O., Cuddalore.
Balasubramaniam, R., Asst. in Vegetables, Coimbatore,	P. P. A. Myco. Pattukottai.
Chandrasekharan, N. R., Oil Seed Asst., Bhavanisagar,	Asst., Groundnut Breeding Station, Tindivanam.
Gopalakrishnan, K., A. D., Chowghat,	Spl. A. D., Com. Project, Palghat.
Govindarajan, T. R., Paddy Asst., P. T. B.	Paddy Asst., Aduthurai,
Krishnamurthy, P. A., Sugarcane Liaison Farm, Nellikuppam,	Sugarcane Asst., Gudiyattam.
Narayanakutti Nair, Field Supervisor, Kozhikode,	Horticultural Asst., Coimbatore.
Pranartharathiheran, F. M., Orthanad,	A. D., Hosur.
Pattathan, B. N., A. D., Puthur,	A. D., Kasargode.
Ramana, G. V., A. D., Attur,	P. A., to D. A. O., Trichy.
Rajagopala Reddy, V., Paddy Asst., Pattukottai,	Paddy Asst., Coimbatore.
Ramakrishna Sarma, A. D., Kasargode,	A. D., Balthamagady.
Rajappan, P. V., Field Officer, Cannanore,	Fruit Asst., Coonoor.
Ramachandran, S., Extension Officer, Sankarankoil,	A. D., Madurai.
Shaukatali, K. A., A. D., Karaikudi,	A. D., Grama Sevak Training Centre, Kallupatty.
Sampath, V., Fruit Asst., Coonoor,	Garden Overseer, Ootacamund.
Subramaniam, C. L., Asst. in Myco., Coimbatore,	Asst. Myco. Sugarcane, Palur.
Sadashiva Shetty, A. D., Balthamgady,	A. D., Puthur
Subramaniam, P. T., Field Supervisor, Cannanore,	Res. Asst., Fruits, in Botany, Coimbatore.
Vittal T. M., F. M., Nellikuppam,	Spl. A. D., Sugarcane, Cuddalore.
Vaidyanathan, J., Spl. A. D., Cuddalore,	Spl. A. D., Vellore.
Venkatarangam, R., Spl. A. D., Sugarcane, Vellore,	Sugarcane Asst., Palur.
Viswanathan, P. S., Asst. in Paddy, P. T. B.,	Chemistry Asst., Coimbatore.
Vasudevan, K. V., A. D., Arasampatty,	A. D., Chowghat.

DISTRICTS

S.ARCOT, COIMBATORE
MALABAR, S KANARA
RAMANATHAPURAM
TIRUNELVELI
NORTH ARCOT



CROPS

COTTON, GINGELLY
GROUNDNUT
COCONUT
ARECANUT
TOBACCO

**Review of Market Conditions for
Commercial Crops in the Areas of Market Committees
during May, 1955**

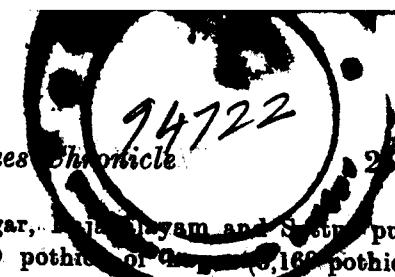
I. Cotton: (In this Section: Candy = 784 lb., Bale = 392 lb., Pothi = 280 lbs.) The cotton market at Tiruppur continued to be brisk during the month. The market started with a carryover stock of 9902 candies of Cambodia lint and 1755 candies of Karunganni lint. Arrivals during the month were 16,887 candies (Cambodia 15,038 candies and Karunganni 1,849 candies) as against 19,668 candies (comprising of Cambodia 16,867 candies and 2801 candies Karunganni) in the previous month. These arrivals included 634 candies of lint obtained from Salem, Madurai and Tiruchirapalli. Disposals of cotton for the period under review were 17,676 candies (Cambodia 16,581 and Karunganni 1,095 candies) including 2,523 candies moved outside the notified area. A stock of 8,359 candies of Cambodia and 2,509 candies of Karunganni lint were left at the close of month.

In the kapas market at Tiruppur there was an opening stock of 30,942 pothies of Cambodia and 5,908 pothies of Karunganni. Arrivals of kapas totalled to 19,755 pothies (15,220 pothies - Cambodia, 4,535 pothies Karunganni) which includes 2,599 pothies received from outside the notified area. Disposals inclusive of the stock issued to gins amounted to 20,389 pothies (15,854 Cambodia, 9,535 Karunganni) at the end of the month.

In Koilpatti market there was an opening stock of 2,000 pothies of cotton kapas. Fresh arrivals accounted for 13,000 pothies during the month. About 10,000 pothies of cotton kapas were sold to the local and Coimbatore mills during the month leaving a closing balance of 3,000 candies at the month end.

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Market Committees Chronicle



The three markets of Virudunagar, Tiruppur and Salem put together opened with a stock of 3,240 pothies of Cambodia and 1,160 pothies Karunganni 80 pothies Cambodia). Arrivals during the month totalled 30,592 pothies (29,920 of Karunganni and 672 of Cambodia). Disposals totally amounted to 31,096 pothies (30,360 Karunganni 736 Cambodia) of cotton kapas. The balance left over at the end of the month was 1,936 comprising of 1920 pothies of Karunganni and 16 Cambodia kapas.

Prices: Cambodia (LINT): The market for Cambodia lint opened at Rs. 882/- per candy at Tiruppur and steadily rose upto Rs. 920/- on 28-5-1955. At the Virudunagar market of Cambodia lint which stood at Rs. 680-700 per candy in the first week marked a gradual decline to close lower at Rs. 640-690.

Cambodia kapas: The prices ruled steady at Tiruppur in the region of Rs. 114/- to 116/- per pothi as against Rs. 107/- to 113/- in the previous month. At the Virudunagar market the rates which opened at Rs. 67-8-0 to 88-8-0 per pothi tended to improve and closed better at Rs. 67-8-0 to 93/- according to quality. Prices of Uganda cotton lint in Virudunagar market marked a slight decline from Rs. 1,096/- to 1,056/- between opening and closing.

Karunganni (LINT): Prices of Karunganni lint at Tiruppur opened at Rs. 690/- per candy and shot upto Rs. 725/- from closing of the third week. At the Virudunagar market prices which commenced at Rs. 680/- to 700/- per candy remained more or less unchanged during the month closing at Rs. 660/- to 700/-. The market for Karunganni at Koilpatti rules at Rs. 676/- per candy for the first quality and Rs. 696/- for the best seed farm lint at the beginning of the month. There was however a gradual improvement to Rs. 716/- during the third week but declining again to close finally at Rs. 700/- which however is a better level than in the previous month.

Karunganni kapas: Prices of Karunganni kapas at Tiruppur market maintained a steady tone at Rs. 80/- to 82/- per pothi during the month. The kapas market for Karunganni at Virudunagar ruled steady at Rs. 76/- to 81/- throughout. Kapas market at Koilpatti opened at Rs. 84/- per pothi for first quality and slid down to Rs. 80/-. Seed farm kapas however maintained a firm level at Rs. 90/- throughout the month.

Cotton Seeds: The opening rates for cotton seeds at Koilpatti market stood at Rs. 20/- per pothi of 252 lb. for the best quality dropped down to Rs. 18/- after a week. The rates for Karunganni seed at Virudunagar market which opened at Rs. 15/- to 18-8-0 per pothi of 252 lb. declined gradually and closed at Rs. 12/- to 15-8-0 towards

closing of the month. Cambodia cotton seed also declined in prices opening at Rs. 14/- per pothi and closing at Rs. 10-8-0 per pothi of 252 lb.

II. Groundnut: (Candy in this section means 531 lb. Kernels and bag is 80 lb. pods.) Arrivals of Groundnut kernels in the eight Regulated markets of South Arcot went down during the month accounting for 1,225 tons of kernels as against 1,551 tons received during last month. North Arcot District accounted for 370 tons of receipts of groundnut kernels, of which 350 tons were received by the Tiruvannamalai market and the remaining by Vellore market.

The average prices for kernels for the whole month as between the different markets of South Arcot were in the region of Rs. 88-8-0 per candy in the Villuppuram market in North Arcot District remained featureless and the hopes of the producers for a rise during the month did not materialise. The prices ranged from Rs. 88/- to 93/- and Rs. 85-8-0 to 88/- respectively at the Tiruvannamalai and Vellore markets at opening period. The closing rates were a little better and stood at Rs. 89/- to 95/- at Tiruvannamalai and Rs. 85/- to 90/- at Vellore. The rates for groundnut pods at Tiruvannamalai remained more or less steady at Rs. 9/- to 9-8-0 per bag of 80 lb. The groundnut kernel rates at Virudunagar market opened steady at Rs. 96/- to 100/- per candy and reached Rs. 93/- to 101/- towards closing period of the month.

III. Gingelly: (Bag in this Section—2 Maunds each of 82 2/7 lb.) The arrivals of gingelly in the five regulated markets of South Arcot were declining during the month. A total quantity of 381 bags of gingelly was received in all the five markets as against 1338 bags in the previous month. Prices of Gingelly seeds ruled at Rs. 18/- to 19/- per maund in all the markets except at Vriddachalam where it remained steady around Rs. 18-8-0 per maund.

IV. Coconut: The four markets in Malabar (Kozhikode, Badagara, Ponnani and Tellicherry) had on opening stock of 4.8 million nuts and 7 million nuts were further received during the month. Out of these 7.5 million nuts were cleared as disposals in the markets leaving a closing balance of 4.4 million nuts. Out of the total disposals of 7.5 million nuts, 7.1 million were despatched to other districts and States. Though the arrivals were heavy there was no shipment during the month.

Opening prices in all the markets of Malabar stood at Rs. 110/- to 135/- per thousand (husked) nuts but slightly went down to Rs. 95/- to 134/- towards the month end. The arrivals in Mangalore were fair and kept pace with disposals. The Mangalore market for coconuts ranged between Rs. 135/- to 160/- per 1,000 (husked) raw nuts and Rs. 160/- to 200/- per 1,000 dry nuts.

Copra: (Candy in this Section—700 lb.) The copra markets of Kozhikode and Badagara held an opening stock of 3,134 candies of copra. A quantity of 5,195 candies were received in both the markets in the month while the disposals accounted for 5,194 candies of which 3,640 candies were despatches sent to places outside the district. A closing stock of 3,135 candies remained in these two markets at the closing of the month.

The prices of copra registered some improvement during the month. The fluctuations as between the different varieties and markets were as noted below:

Varieties	(In Rupees per candy of 700 lb.)			
	Kozhikode		Badagara	
	Maximum	Minimum	Maximum	Minimum
Office	300	282	235	280
Edible	335	295	305	290
Madras	385	285	385	365
Rajpur	430	425	437	430

At Mangalore the transactions were limited and the prices ranged from Rs. 281/- to 307-9-0 per candy of 700 lb.

V. Arecanut: The Supari stocks at Mangalore opened at 10,351 Cwt. and 11,000 Cwt. were added to this by the receipts during the month. Disposals and exports accounted for 18,409 Cwt. leaving a closing balance of 2,942 Cwt. at the end of the month. The prices of Supari were steady during the first half of the month and declined thereafter. The ranges of prices of different varieties in Mangalore market are indicated below:—

	(Price per candy of 700 lb. in Rupees)	
	Maximum	Minimum
Mangalore Supari	175	153/12
Malabar Supari	132/9	159/2
Koka	95/8	127/5

The stock of arecanut (chur) in Kozhikode, Ponnani and Palghat markets at the commencement of the month was 945 bags (each bag 100 lb.) while 442 bags were received during the month. Disposals both by way of local sales as well as despatches amounted to 416 bags leaving 853 bags at close of the month. The prices of arecanut at Palghat ruled at Rs. 175/- to 192/- per bag and remained more or less steady through out the month.

VI. Tobacco: (Candy in this Section is 500 lb.) A total opening stock of 11,210 candies of chewing tobacco and 3,848 candies of cheroot tobacco was handled in the markets of Coimbatore District. Out of these 2,920 candies of chewing variety and 1,290 candies of cheroot tobacco were despatched to places outside the district chiefly, Dindigul, Palghat,

Thiruvananthapuram, Vedaranyam, Padukottai and parts of Travancore-Cochin State. Tobacco market ruled firm with a slight improvement in prices. The range of prices was as indicated below:—

Variety	(Price per Candy)		
	Grade I Rs.	Grade II Rs.	Grade III Rs.
1. Chewing tobacco (Sun cured):			
(a) Meenampalayam ...	480—510	350—440	200—300
(b) Other varieties ...	425—450	275—340	200—250
2. Cheroot varieties (Sun cured):			
(Erode and Bhavani Crops)...	200—240	140—180	100—120

Activities of the Market Committees During the Month of May, 1955

Of the seven Market Committees in the State, five in the districts of North Arcot, South Arcot, Coimbatore, Malabar and South Kanara were actively functioning. The activities of the Committees in the districts of Ramanathapuram and Tirunelveli continued to be restrained because of the injunction order of the Madras High Court.

The following progress was made by the Market Committees during the month in the issue of licences under the Madras Commercial Crops Markets Act.

Committees	Licences to Persons for places under				Licences to			
	Section 5(1)		Section 5(3)		Weighmen		Brokers	
	A	B	A	B	A	B	A	B
North Arcot								
Market Committee ...	76	694	30	327	20	270	—	10
South Arcot								
Market Committee ...	72	1077	77	1247	15	458	2	5
Tirunelveli								
Market Committee ...	—	36	—	15	—	17	—	—
Coimbatore								
Market Committee ...	23	43	26	68	—	—	—	—
Malabar								
Market Committee ...	9	268	23	890	4	104	—	5
South Kanara								
Market Committee ...	16	195	12	163	4	37	—	38
(A: During the Month. B: Progressive total for the year)								

The total of transactions in commercial crops in the thirteen regulated markets in the State during May 1955 is extracted below:—

Crop	Quantity	No. of Regulated Markets
Groundnut kernels ...	1,225 tons	10
Gingelly ...	381 bags (2 Mds. each)	5
Cotton Lint ...	4,644 Candies (784 lbs. each)	3
Cotton kapas ...	10,261 pothies (280 lb. each)	3

Meetings: A meeting of the South Arcot Market Committee was held on 13—5—'55 and 34 subjects were discussed. A meeting of Malabar Market Committee was conducted on 31—5—'55 when three subjects were tackled for discussion. The other committees are functioning under the respective District Collectors under Section 6-A. of the Madras Commercial Crops Markets Act.

Special features: The Joint Secretary to Food and Agriculture Department, Government of India and the Registrar of Co-operative Societies, Madras paid a visit to the Regulated Markets of South Arcot Market Committee at Tindivanam and Cuddalore on 27th and 28th respectively. Remarks made by these visitors are extracted below:—

Remarks made by the Joint Secretary, Ministry of Food and Agriculture, Government of India, New Delhi, at Tindivanam Regulated Market on 27—5—'55.

"I visited this Institution this morning and was very much impressed with the progress that it has been steadily making during the last several years. I am afraid however that I have not seen similar institution elsewhere and this is my first acquaintance with operations of an institution of this nature. Such bodies could do a lot in the country and I think I could point to other State Governments what is being done in Madras State in this sphere."

Remarks made by Registrar of Co-operative Societies, Madras on 28—5—'55 at Cuddalore Regulated Market.

"I and Sri R. S. Krishnaswami, Joint Secretary, Food and Agriculture Department, Government of India were shown round the working of the Regulated Market Scheme in respect of Groundnuts. The buyers and sellers stand to gain with the arrangements in vogue and it is gratifying to be told that more than 90% of the arrivals at Cuddalore are handled at the Committee".

The Director of Co-operation, New Delhi visited Malabar and South Kanara Districts during the month and conducted enquiries with special reference to the facilities to be afforded to the growers under

financing storage and Marketing. In G. O. Ms. 1351, Agriculture Department dated 17-5-'55 the Government have issued directions that in making badges for weighmen all the Market Committees should adopt strict uniformity in the design and description of the badges as laid down in the G. O. The Committees are also advised to give wide publicity about the adoption of the badges prior to their being used by weighmen.

Quality appraisal: The South Arcot Market Committee continued its work on the quality of groundnut kernels marketed in five of its Regulated markets on the basis of random sampling. A total of 630 samples of groundnut kernels were drawn from arrivals into five regulated markets from 3,643 lots comprising 1,225 tons.

A quality competition in Groundnut brought up for sale in the regulated markets of South Arcot in respect of the summer crop was inaugurated. But there were no entries during the month as the pace of arrivals had not picked up momentum.

Groundnut Oil Industry — Cost of Production of Groundnut Oil

by

K. V. NATESAN, B. Sc. (Ag.),
Secretary, South Arcot Market Committee, Cuddalore

Production of groundnuts in South Arcot District is estimated at one lakh of tons of kernels. Of this quantity 20% or 20,000 tons is the estimated quantity reserved for seed and edible purposes. Out of the balance of 80,000 tons 5,000 tons are estimated as consumed by local country chekku owners and 50,000 tons by power crushers like Rotaries and Expellers. The balance quantity is despatched outside the district for the oil crushing industry. This district was exporting nearly 80% of its marketable surplus to foreign countries before the commencement of the world War II in 1939. After the close of the War and with the stoppage of Export of Groundnut kernels to foreign countries, local capitalists and industrialists have set up a number of oil crushing units in various assembling centers of this district. Now there are 67 Expellers, 46 Rotaries and 1500 country chekkus working in the District. The Mill Owners and Chekku Owners are the chief buyers of the groundnut kernels arriving in the Regulated Markets of South Arcot. The Mill Owners buy the groundnuts based on the price of oil at Madras Port.

The crushing of groundnuts in the District is carried out by

- (a) Country wooden or Stone Chekku (Village Ghanis)
- (b) Power Driven Rotaries, and
- (c) Expellers.

Chekku (Village Ghanis): There are 1500 country chekkus working in the district. They are worked individually by their owners, who crush the groundnuts either purchased by them or for hire, in which case a charge is levied for crushing either in the form of cash or as cake. If it is the latter, the entire quantity of cake is retained as crushing charges. They are able to crush about 25 to 30 lb. of kernels per charge and about a bag of 177 lb. of kernels per day of eight hours working. The oil from the chekku is not filtered. Some persons prefer chekku oil to the expeller oil for consumption. The chekku oil cake is preferred to the expeller cake as cattle food as the former contains a higher percentage of oil.

Cost of Production of Oil:

1. Establishment charges for a day of 8 hours for the feeder and driver	Rs. 1-8-0
2. Cost of bag of kernels at Rs. 34/- per bag of 177 lb.	" 34-0-0
3. Depreciation on the chekku, animals, pots and other accessories	" 1-8-0
4. Other contingencies	" 1-0-0
	Rs. 38-0-0

At 40% extraction of oil through country chekku, the quantity of oil that will be produced will be 70 lb. of oil 105 lb. cake and 2 lb. being wastage.

Cost of cake at Rs. 14/- per bag of 160 lbs. (loose)	Rs. 8-12-0
Therefore cost of production of 70 lbs. of oil	
Rs. 38-0-0 minus Rs. 8-12-0	" 29-4-0
or Cost of one candy of oil	" 209-0-0

Rotaries: There are 46 Rotaries in the District. These are more or less of the type of chekku but made of iron and worked by power. Each Rotary is able to take in 25 to 30 lb. of kernels per charge. A rotary mill can crush about 900 lb. of kernels (or 5 bags) per day of 8 hours working. As in the case of country chekkus, the whole kernels are fed to the mortar and water is added now and then for clarification during the process of crushing. The oil which flows through a hole provided in the bottom of the mill is either collected directly or allowed to flow into a "Settling Tank". There are factories which have five to eight rotaries in them.

Cost of production of oil: Assuming that there are four rotaries in a factory it will handle 20 bags of groundnut kernels (each bag 177 lb. nett) in a day of 8 hours working and produce 1400 lb. of oil and 2100 lbs. of cake taking the out-turn at 40% of oil and 58% cake and allowing for a wastage of 2%.

Daily Expenses:

1. Cost of 20 bags of kernels at Rs. 34/- per bag	Rs. 680—0—0
2. Over head charges on establishment taxes, rent, postage and telegram, sales tax and electric energy	13—0—0
3. Wages for drying packing, stitching of bags etc., and transport	5—0—0
4. Lubricants and sundries	1—0—0
5. Travelling Expenses of staff	2—0—0
6. Maintenance of buildings and repairs and upkeep	2—0—0
7. Depreciation on buildings at 5% per annum	3—0—0
8. Depreciation on machinery at 10% per annum	3—0—0
9. Depreciation of furniture and electric installation	0—8—0
10. Depreciation on barrels and gunnies	4—8—0
11. Cost of spare parts, Insurance charges etc.	7—8—0
12. Fees on groundnuts	2—0—0
13. Lorry Charges to Madras or to local market centre	2—8—0

Total Rs. 726—0—0

Cost of 2100 lbs. of cake (at Rs. 12/- per bag of 160 lb.)	Rs. 157—0—0
Therefore cost of production of 1,400 lb. oil	
Rs. 726/- minus Rs. 157—8—0 i. e. Rs. 568—8—0	
Therefore cost of one candy of oil	203—0—0

Expellers: This is the most important type of machinery used for crushing groundnuts. After 1946, many expellers have been set up. Such factories have been established not only in the assembling centres of the district but also in important consuming centres outside namely, Madras, Tiruchirapalli, Madurai, Virudhunagar etc., In each such factory there are from two to four expellers, but some factories like those of Messrs. Louis Dreyfus & Co., Ltd., at Tindivanam and Messrs. Rallis India Ltd., at Cuddalore have giant expellers with higher capacity for crushing. Though the type of expellers differ, the principle of working of these expellers is the same in all. An expeller is able to crush as much as 60 to 75 bags of groundnuts per day of 24 hours of three shifts of 8 hours duration for each shift. Maximum quantity of oil extraction is obtained when groundnuts are crushed through expellers.

The yield of oil and cake obtained by crushing of groundnuts varies with the quality of kernels, variety used, rainfed or irrigated, soil and climatic conditions. Figures collected from different oil mills in South Arcot district show that the yield of oil varies from 41% to 45% according to different types of kernels, the summer irrigated kernels of Virudhachalam Market producing the maximum out-turn of oil. Allowing two percentage wastage, the balance 57% to 53% is the quantity of cake that can be expected.

Cost of Production of Groundnut Oil by Expellers: Assuming that there are four expellers in a factory it will easily handle 230 bags of groundnut kernels (each bag 177 lb. of kernels nett) in a day and produce 35 candies of oil (one candy 500 lb. nett) and 147 bags of groundnut cake (a bag of cake 160 lb. nett), taking the out-turn of oil at 43% and the cake at 55% and allowing for the wastage of 2%.

The following are the expenses of a monthly nature the number of working days in a month being taken as 24 on an average.

1. Establishment charges on a monthly basis	Rs. 900—0—0
2. Tax, licence fees, Panchayat or Municipal fees etc.,	200—0—0
3. Tapals, Telegrams and Postage	100—0—0
4. Sales tax on purchase of kernels	3,000—0—0
5. Electric charges for lighting and power	750—0—0
	Rs. 4,950—0—0
or Expenses per day	206—4—0

Daily Expenses:

1. Cost of 230 bags of groundnuts at Rs. 34/- per bag	Rs. 7,820—0—0
2. Over head charges as above	206—4—0
3. Wages for drying, packing, stitching of groundnut bags-casual labour before transport to factory	45—0—0
4. Fuel for boiler	40—0—0
5. Lubricants and Sundries	5—0—0
6. Travelling expenses of Staff	10—0—0
7. Audit Expenses	1—0—0
8. Printing and Stationery	2—0—0
9. Maintenance of buildings repairs and white washing	5—0—0
10. Depreciation on buildings at 5% per annum	12—8—0
11. do. on machinery at 10%	15—0—0
12. do. on furniture, electric installation at 6%	1—0—0
13. Depreciation on barrels and gunnies	15—4—0
14. Cost of spare parts, insurance, income-tax, bank interest etc.,	80—0—0
15. Fees on groundnut, carting charges from market to factory	60—0—0
16. Lorry Charges on 35 candies of oil to Madras	150—0—0
Total Rs.	8,468—0—0

Receipts:

35 candies of oil at Rs. 200/- per candy	Rs. 7,000—0—0
147 bags of cake at Rs. 12 per bag	„ 1,764—0—0
	Rs. 8,764—0—0

Net profit per day	Rs. 8,764—0—0 minus	
	„ 8,468—0—0	„ 296—0—0

Cost of production of a	
candy of oil	Rs. 8,764—0—0 minus cost of cake
	„ 1,764—0—0
	„ 6,704—0—0 divided by 35
i. e.	„ 181—7—0 per candy

The cost of production of oil at the different mills varies according to the price of groundnuts and other incidental charges. The cost is worked out at current prices of kernels and oil in March 1955.

Crop and Trade Reports

Crop—Green-gram—1954—'55—First and Final Forecast Report: The area sown with greengram in Madras State upto 25th December 1954 is estimated at 1,28,000 acres. Compared with the estimated area of 1,27,100 acres for the corresponding period of the previous year, this is an increase of 0.7 per cent. Compared with the average area of 1,24,600 acres calculated for the previous five years ending with 1952—'53 this is an increase of 2.7 per cent. The crop is mainly grown in the districts of Coimbatore, Tanjore and Tirunelveli. An increase in area is estimated in the districts of Chingleput, North Arcot, Tanjore, Ramanathapuram, Tirunelveli and South Kanara and a decrease in other districts of the State except Tiruchirapalli and Madurai where the area estimated was the same as that of last year. The area under the crop was nil or negligible in the Nilgiris district. The crop has been harvested in some districts of the State. The yield per acre is expected to be slightly below normal in all the districts of the State. The seasonal factor for the State as a whole works out to 97 per cent of the normal as against 96 per cent of the normal for the previous year. On this basis, the total yield works out to 10,300 tons of cleaned grain. Compared with the yield of 10,000 tons of cleaned grain estimated for the previous year, the present estimate is an increase of 2.0 per cent. Compared with the average yield of 8,300 tons of the cleaned grain calculated for the five years ending with 1952—'53 this is an increase of 24.1 per cent. The average wholesale price of greengram (Dhall) per maund of 82 2/7 lb. on 8th January 1955 was Rs. 16—0—0 in Salem. Compared with the price which prevailed on 9th January 1954, this shows a decrease of 22.0 per cent.

Blackgram—1954—'55—Madras State—First and Final forecast Report: The area shown with blackgram in the Madras State upto 25th December 1954 is estimated at 1,28,500 acres. Compared with the estimated area of 1,41,000 acres

for the corresponding period of the previous year and the average area of 1,43,900 acres calculated for the previous five years ending with 1952—'53, the present estimate is a decrease of 8.9 percent and 10.7 percent respectively. The crop is mainly grown in the districts of Tanjore, Madurai, Tirunelveli, Malabar and South Kanara. A decrease in area is estimated in the districts of Chingleput, Coimbatore, Tiruchirapalli, Tanjore, Tirunelveli and South Kanara and increase in area in Ramanathapuram district and the area estimated for other districts is the same as that of last year. The area under the crop in the Nilgiris district is little or negligible. The crop has been harvested in some portions of the districts of the State. The yield per acre is expected to be normal in the districts of Tiruchirapalli and Tanjore and slightly below the normal in the other districts of the State. The seasonal factor for the State as a whole works out to 97 per cent of the normal as against 96 per cent estimated for the previous year. On this basis the total yield works out to 13,500 tons of cleaned gram. Compared with the yield of 14,500 tons of cleaned gram estimated for the previous year the present estimate shows a decrease of 6.9 per cent. It shows an increase of 9.8 per cent when compared with the average yield of 12,300 tons of cleaned gram calculated for the five years ending 1952—'53. The average wholesale price of blackgram (dhall) per maund of 82 2/7 lbs. (3,200 tolas) as reported from some of the important centres on 8—1—1955 was Rs. 15—8—0 at Salem Rs. 20—8—0 at Tanjore and Rs. 23—7—0 at Tirunelveli. Compared with the prices that prevailed during the corresponding period of last year the present prices reveal a fall of 22.2 per cent at Tirunelveli, 22.7 per cent at Salem and 24.1 per cent at Tanjore.

Horsegram—1954—'55—Madras State—First and Final Forecast Report: The area sown with horsegram in the Madras State upto 25th December 1954 is estimated at 5,64,800 acres. Compared with the area of 5,53,200 acres estimated for the corresponding period of last year and the average area of 5,40,800 acres calculated for the previous five years ending with 1952—'53, the present estimate reveals an increase of 2.1 per cent and 4.4 per cent respectively. A decrease in area is estimated in the districts of Salem, Tanjore and South Kanara and an increase in area in all the other districts of the State except Chingleput and Tiruchirapalli where the area was the same as that of last year. The area under the crop in the Nilgiris district was little or negligible. The yield per acre is estimated to be normal in the districts of the Tiruchirapalli and Tanjore and slightly below the normal in the other districts of the State. The seasonal factor for the State as a whole works out to 97 per cent of the normal as against 98 per cent of the normal estimated for the previous year. On this basis, the yield works out to 48,900 tons. Compared with the estimated yield of 48,700 tons for the corresponding period of last year and the average yield 34,400 tons calculated for the previous five years ending with 1952—'53, the present estimate shows an increase of 0.4 per cent and 42.2 per cent respectively.

Ragi—Second Report—1954—'55—Madras State: The area sown with ragi upto the end of December, 1954 is estimated at 790,500 acres. Compared with the area of 777,800 acres estimated for the corresponding period of the previous year, this is an increase of 1.6 per cent. As compared with an average area of 727,300 acres calculated for the five years ended 1953—'54, the present estimate shows an increase of 8.7 per cent. The crop has been or was being harvested in the districts of Chingleput, South Arcot, North Arcot, Salem, Coimbatore, Madurai, Malabar, South Kanara and the Nilgiris, at the time of the report. The yield per acre is expected to be slightly below normal in all the districts of the State. The seasonal factor for the State as a whole works out to 95 per cent of the normal as against 98 per cent estimated for the corresponding period of the previous year. On this basis, the total yield works out to 362,500 tons of unhusked grain or 326,200 tons of

cleaned grain as against 368,100 tons of unhusked grain or 331,300 tons of cleaned grain estimated for the corresponding period of the previous year, representing a decrease of 1.5 per cent. As compared with the average production of 273,900 tons of unhusked grain or 246,500 tons of cleaned grain calculated for the five years ended 1953-'54, the present estimate shows an increase of 82.3 per cent. The wholesale price of ragi per standard maund of 82 2/7 lb. as reported from some important market centres for the fortnight ending 31st December, 1954 was Rs. 8-0-0 at Tiruppur, Rs. 8-0-0 at Kanchipuram and Salem and Rs. 10-12-0 at Vellore.

Crop—Cholam—(Jowar)—1954-'55—Third and Final Forecast Report—Madras State: The area sown with cholam (Jowar) in Madras State in 1954-'55 is estimated at 1,953,600 acres. Compared with the final estimate of 1,994,600 acres for the previous year, the present estimate is a decrease of 2.1 per cent. It shows an increase of 11.3 per cent over the average area for the five years ended 1953-'54 viz. 1,754,400 acres. Cholam is not grown in the district of South Kanara and is an insignificant crop in Malabar, Tanjore and the Nilgiris districts. Compared with the final area of 1953-'54, the present estimate reveals an increase in the districts of Chingleput, South Arcot, Tiruchirapalli, Tanjore, Ramanathapuram, Tirunelveli, Malabar and the Nilgiris and a decrease in the other districts of the State. The main crop has been harvested in most districts of the State. The seasonal factor for the State as a whole works out to 98 per cent Kharif Crop and 96 per cent of Rabi Crop, as against 96 per cent and 94 per cent respectively for the previous year. The total yield for the State works out to 637,800 tons of unhusked grain or 542,100 tons of cleaned grain. This shows a decrease of 0.1 per cent when compared with the yield of 638,500 tons of unhusked grain or 542,700 tons in terms of cleaned grain estimated for the previous year and an increase of 38.9 per cent as compared with the average yield of 459,300 tons of unhusked grain or 390,500 tons of cleaned grain estimated for the five years ended 1953-'54.

Tobacco—Second Report—1954-'55—Madras State: The area under tobacco sown up to the end of February 1955 is estimated at 45,900 acres. Compared with the area of 47,700 acres estimated for the corresponding period of last year, it is a decrease of 5.2 per cent. Compared with an average area of 43,300 acres calculated for the previous five years ending with 1953-'54, this is an increase of 4.4 per cent. An increase in area is estimated in the districts of North Arcot, Madurai, Ramanathapuram and South Kanara and a decrease in area in the other districts of the State except Chingleput, Malabar and the Nilgiris where the area under tobacco is little or negligible and Tiruchirapalli district where the area is expected to be the same as that of last year. The crop is reported to have been attacked by aphids in Coimbatore district. The yield per acre is expected to be normal in the district of South Kanara and slightly below normal in the districts of the State. The seasonal factor for the State as a whole works out to 92 per cent of the normal as against 98 per cent of the normal estimated for the corresponding period of last year. On this basis, the total yield works out to 25,100 tons of cured leaf as against 28,100 tons of cured leaf for the corresponding period of last year representing a decrease of 10.7 per cent. Compared with an average yield of 20,200 tons calculated for the previous five years ending with 1953-'54. This is an increase of 23.6 per cent. The wholesale price of tobacco per standard maund of 82 2/7 lb. or 3,200 tolas as reported from important market centres on 12-3-1955, was Rt. 49-14-0 in Tiruppur and Rs. 41-0-0 in Erode. Compared with the prices which prevailed on 13-3-1954, the price at Tiruppur reveals an increase of 5.1 per cent, the price in Erode remaining stationary.

Maize—Madras State—1954-'55—First and final forecast report: The area sown with Maize in the Madras State in 1954-'55 is estimated at

15,900 acres. Compared with the corresponding area of 14,400 acres estimated in the previous year, there is an increase of 10.4 per cent. The estimated area in the current year is higher than the average area during the five years ended 1952-'53 viz., 12,200 acres by 30.3 per cent. The area under the crop is little or negligible in the districts of Ramanathapuram, Tirunelveli, South Kanara and the Nilgiris. A decrease in area is estimated for Tanjore district while the area estimated for Coimbatore and Malabar districts is the same as in the previous year. The area estimated for the other districts show an increase. The crop has been or is being harvested. The yield per acre is estimated to be normal in the districts of the State.

The seasonal factor for the State as a whole works out to 99 per cent as against 98 percent estimated for the corresponding report of the previous year. On this basis, the total yield works out to 6,900 tons of unhusked grain or 4,900 tons in terms of cleaned grain as against 6,390 tons of unhusked grain or 3,800 tons of cleaned grain estimated for the corresponding report of the previous year, representing an increase of 9.5 per cent.

Ragi—Third or final forecast for the year 1954-'55—Madras State: The area sown with ragi in the Madras State in 1954-'55 is estimated at 1,004,500 acres. Compared with the provisional figures of area of 1,031,000 acres for the previous year according to the Season and Crop Report the current year's estimate is a decrease of 2.6 per cent. Compared with the average area of 908,800 acres calculated for the five years ended 1953-'54 the present estimate is an increase by 95,7000 acres or 10.5 per cent. Compared with the provisional figures of area for the previous year the present estimate reveals an increase in area in the districts of Chingleput, South Arcot, Coimbatore, Tirunelveli, Malabar, South Kanara and the Nilgiris and a decrease in area in the remaining districts of the State. The main crop has been harvested. The yield per acre is estimated to be normal in the other districts of Salem, Coimbatore, Tanjore, Tirunelveli and the Nilgiris and slightly below normal in the other districts of the State.

The seasonal factor for the State as a whole works out to 97 per cent of the normal as against 96 per cent for the previous year. The total yield works out to 469,500 tons of unhusked grain or 422,500 tons of cleaned grain. Compared with the provisional estimate of 473,800 tons of unhusked grain or 426,400 tons of cleaned grain according to the Season and Crop Report for the previous year, the current year's estimate represents a decreased of 0.9 per cent. The present estimate reveals an increase of 35.3 per cent as compared with the average of 347,100 tons of unhusked grain or 12,400 tons of cleaned grain calculated for the five years ended 1953-'54. The wholesale price of ragi per standard maund of 82 2/7 lb. (3,200 tolas) as reported from some market centres for the week ending 12-3-1955 was Rs. 10/-at Vellore, Rs. 8-2-0 at Salem and Rs. 7-10-0 at Tiruppur. Compared with the prices which prevailed during the corresponding period of the previous year, the current prices reveal a fall of 23.3 per cent at Tiruppur, 19.3 per cent at Salem and 18.4 per cent at Vellore.

Onions—Second and final forecast Report—1954-'55—Madras State: The area under onions in the Madras State during 1954-'55 is estimated at 26,600 acres. Compared with the final area of 24,400 acres and an average area of 22,200 acres calculated for the five years ending with 1953-'54 the present estimate is an increase of 9.0 per cent and 19.8 per cent respectively. The area estimated is the same as that of last year in the districts of Chingleput, Tanjore and the Nilgiris, a decrease in Madurai district and an increase in the other districts of the State except Malabar and South Kanara districts where the area under the crop is little or negligible. The main crop has been harvested. The seasonal factor for the

State as a whole works out to 96 per cent of the normal as against 93 per cent of the normal estimated for the previous year. On this basis, the total yield works out to 126,600 tons as against 116,300 tons estimated for the previous year and an average yield of 92,200 tons calculated for the previous five years ending with 1953-'54 representing an increase of 8.9 per cent and 37.3 per cent respectively. The average wholesale price of onions per maund of 82 2/7 lb. or 3,200 tolas as reported from important market centres on 14-5-1955 was Rs. 5-0-0 in Coimbatore and Mangalore Rs. 4-13-0 in Kancheepuram, Rs. 4-0-0 in Vellore and Nagapattinam. Compared with the prices which prevailed in the corresponding period of the previous year, these prices reveal an increase of 14.3 per cent in Mangalore and a decrease 16.3 per cent in Kancheepuram and 15.8 per cent in Nagapattinam the prices remaining stationary in Coimbatore and Vellore.

Gingelly—Fourth and final forecast report—1954-'55—Madras State: The area sown with gingelly (sesamum) in Madras State in 1954-'55 is estimated at 4,58,500 acres. Compared with the final area of 4,52,700 acres for 1953-'54, the present estimate shows an increase of 1.3 per cent. The present estimate reveals an increase of 20.4 per cent over the average area of 3,80,800 acres calculated for the five years ending 1953-'54. An increase in area is estimated in the districts of Chingleput, North Arcot, Coimbatore, Tanjore, Tirunelveli and Malabar and a decrease in other districts of the State. The crop has been or is being harvested in most of the districts of the State. The yield per acre is expected to be normal in the districts of Tanjore and Tirunelveli and slightly below normal in the remaining districts. The seasonal factor for the State as a whole works out to 97 per cent of the normal as against 93 per cent of the normal as against 93 per cent of the normal as against 93 per cent for the previous year. On this basis, the total yield works out to 57,700 tons as against 55,100 tons estimated for the previous year; representing an increase of 4.7 per cent. Compared with the average yield out to 57,700 tons as against 55,100 tons estimated for the previous year; representing an increase of 4.7 per cent. Compared with the average yield of 41,800 tons calculated for the five years ended 1953-'54 the present estimate is an increase of 38.0 per cent. The wholesale prices of gingelly seed per standard maund of 82 2/7 lb. or 3,200 tolas, as reported from important market centres on 9th April 1955 was Rs. 21-12-0 at Tuticorin, Rs. 20-6-0 at Tiruchirappalli, Rs. 20-1-0 at Salem and Cuddalore and Rs. 20/- at Tirunelveli. Compared with the prices which prevailed on 10th April 1954 these prices show a decrease of 35.4 per cent at Salem, 33.4 per cent at Tirunelveli, 31.0 per cent at Cuddalore.



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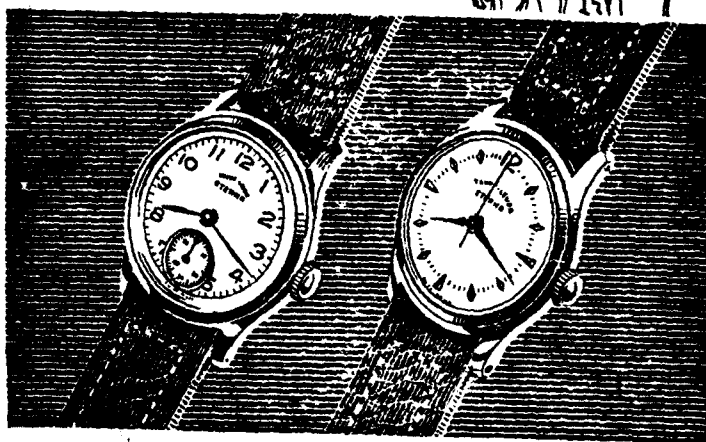
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