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which control the initial development of the mammary glands as well as the intensity of their secretion, and again it has proved possible to influence to a significant degree the content of milk in several important constitutents. All these investigations, still essentially laboratory matters, are likely fairly soon to reach the point where we can begin to apply them in practice, when they may open up great possibilities of control over our milk supply, particularly in the difficult winter months.

A somewhat more speculative possibility is the employment of hormones for the control of size. In some animals at least, for example, the rat, it has been possible to obtain considerably increased growth by suitable hormone injections. Further, the embryo of a mammal is in a somewhat similar position as regards its mother as the plant grafts mentioned earlier; an effect exerted primarily on the mother may, by influencing the early development of the foetus, produce an alteration which will affect the development of the next generation of young and thus be transmitted potentially for ever. That such an influence of the mother on her offspring of the first generation is a possibility is known from crosses between large and small breeds of horse, in which the size of the mother has a great effect on the size of the foal. An effect in more remote generations has been suggested by some workers using extracts of the thymus gland on rats. The matter is still very uncertain, but if it can be put on a firm basis very important results might be obtained. A further and still more speculative possibility may perhaps be worth mentioning; it has been claimed that the very early administration of growth-promoting extracts has a differential effect on those organs which develop most rapidly at early stages, particularly the brain. It is not clear whether the swollen-headed rats so produced were any cleverer than usual, but the possibility of such an effect may be worth considering, if only as a day-dream to solace the despair to which most educators are from time to time reduced. Let us hope, however, that man is already intelligent enough to use, for his benefit and not only for his destruction, the gifts which science offers, without waiting for a hormonally induced enlargement of his brain. (*Nature No. 3800, August 29, 1942.*)

What's doing in All India—Madras

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Madras is conducting a vigorous campaign to increase the production of food crops. To stimulate production, the Government granted a number of concessions to the cultivators and the Agricultural Department is doing intensive propaganda for growing crops by improved methods. In addition to meeting the farmers personally, agricultural officers arranged nearly 3,000 exhibitions and meetings. Propaganda is directed mainly towards (i) bringing new areas under food crops, (ii) adopting intensive methods of cultivation, and (iii) reducing the acreage under commercial crops and using the areas so saved for the growing of food.

Increasing area under food crops In Tanjore, the premier rice growing district, the Government provided irrigation water from rivers and channels by about three weeks earlier to enable the cultivator to begin paddy cultivation early and take two crops of paddy from single crop paddy land. The Government also removed the minimum of Rs. 5 charged as water rate for the second crop land and levied only half the single crop assessment. Landowners, taking advantage of these concessions, put 20,000 acres of the single crop area in Tanjore district under double cropping. In addition to this, the early supply of water

enabled, a large area so far considered as dry to be brought under single crop paddy cultivation. Similar attempts have been made in other rice growing areas to increase the number of crops and to bring the suitably situated dry areas to wet cultivation.

The Government permitted the growing of food crops free of assessment on assessed Government land, unassessed land or disafforested areas in which crops had not been grown in Faslis 1349 and 1350. In the Tanjore and Trichinopoly districts permission was given for food crops on certain land unoccupied for 18 months. Permission was granted for the cultivation of tank beds free of charge provided the crops are removed before the tank is required for storing water. In the allocation of land preference is given to the deserving poor not already owning land. Arrangements have also been made to lease out railway land for cultivation. Permission for the revenue-free cultivation of land around schools, churches, etc. has been granted. The Agricultural Department made every effort to see that these concessions are fully availed of by the cultivators. Dry food crops like sorghum, *cumbu* (*Pennisetum typhoides*), and *tenai* (*Setaria italica*) are suitable for most of these areas and improved seeds are distributed. Steps were taken to see that all Government office compounds are sown with food grains or vegetable seed. Advice was given in some cases to utilize the space between fruit trees in orchards for food crops. For example in Malabar and South Kanara dry paddy has been advocated in fruit gardens and coconut plantations are being interplanted with tapioca, sweet potato, yams and other vegetables.

Intensive methods of cultivation To increase the yields, rice growers were induced to use improved seed, reduce the seed rate, adopt economic transplanting of seedlings and apply manure liberally. For the multiplication of pure paddy seed on an extensive scale the Government sanctioned four schemes, one in the Cauvery delta, one in the Godavari delta, one in the Kistna delta, and another in the South Arcot district. In most places seed farms have been started by the Department for the supply of improved seed. Agricultural improvement co-operative societies are helping in the production and distribution of pure seed. Vigorous propaganda for reducing seed rate resulted in the saving of paddy seed and production of healthy plants. In the Tanjore district the cent nurseries in which 2½ lb. of paddy seed is sown in a cent of nursery have become very popular.

The Agricultural Department has done intensive propaganda for the increased use of green manures. One of the difficulties in growing green manures have been the lack of sufficient quantities of seed. Growing of green manure for seed in orchards, palmyra groves and on field edges is advocated. Villagers are requested to gather seed and sell it to the Agricultural Department. Large quantities have been bought from available areas and distributed all over the province. In Tanjore, attempts were made to induce village children to gather green manure seed and earn small sums of money. The Department has a number of approved green manure plants—*dhaincha* (*Sesbania aculeata* Pers.), *kolinji* (*Tephrosia purpurea* Pers.), *pillipesara* (*Phaseolus trilobus* Ait.) *sunn hemp* (*Crotalaria juncea* L.), and indigo (*Indigofera Anil* L.). In addition to these, the Department distributed seeds and advocated the planting of several leaf-yielding trees on porombokes, canal bunds, etc.

Groundnut cake is another manure extensively advocated. Efforts are being made to buy cake and distribute it to farmers at reasonable prices. The government sanctioned a considerable sum of money for this purpose.

Loans for seed and manure The Government empowered District Agricultural Officers to grant loans up to Rs. 25 to deserving cultivators for buying seed and manure. A large number of them sought the help of Agricultural Officers

to secure this concession. In the Kistna district, the District Agricultural Officer granted in July 1924 nearly 1,500 loans amounting to Rs. 40,000.

The Government allowed the cultivation of the backyards of houses free of assessment provided vegetables or food grains are grown and the Agricultural Department made every effort to induce householders to utilize their backyards. Large quantities of vegetable seeds were distributed. All the Government farms were growing vegetables to multiply seed for distribution among cultivators. Seeds of several varieties of improved vegetables were made available. The Millet Breeding Station, Coimbatore, distributed in June 1942 over 100 lb. of improved vegetable seeds, including seeds of three leguminous vegetables that are capable of being grown under rainfed conditions.

Efforts were made to convince the farmers of the desirability of growing food crops in preference to non-food crops. The area under cotton, groundnut, etc. was decreased and cereals were sown. In places where the commercial crop is sown as a mixture with a cereal like the Italian millet, larger proportions of the cereals were advocated.

A factory designed for the manufacture of 36,000 lb. of malt food per annum from sorghum grain has started production at Coimbatore. The process for making malt food from sorghum and other locally available cereals was developed at the laboratory of the Government Agricultural Chemist after several years of research. Tests in the laboratory have shown that sorghum malt food is as high in value as other popular malt foods. Clinical tests carried out in 27 Government and private hospitals have proved that this product is suitable for all classes of hospital cases and is specially indicated in cases of gastro-intestinal disorders.

A technique for the manufacture of malt extract has also been perfected. This product is a viscid, light coloured liquid capable of being blended with shark liver oil to give a vitamin-rich concentrate. Arrangements for its commercial production are nearing completion.

Campaign against soil erosion Soil erosion is a problem nearly all over the province. As a preventive, bunding has been widely advocated. The Research Engineer's 'bund former,' a simple but efficient implement designed in the workshop of the Agricultural College, Coimbatore, has been found very satisfactory for this purpose. Levelling, terracing and the planting of trees are other methods suggested. Contour planting of potatoes on the Nilgiri hills has been found to check erosion.

Spacing experiments with paddy showed that close planting of seedling 4 in. and 6 in. apart as against wide planting 12 in. apart contributed to increase of the yield of grain and straw. The exact closeness 4 in. or 6 in. was indicated by the duration of the varieties. The work on pre-sowing treatment of seed paddy by alternately germinating and drying periodically to induce resistance to drought is in progress. It was found that up to a limit germinated seeds when sun dried and resoaked germinated normally.

Burying of coconut husks and leaves in trenches has improved the condition of coconut palms in the red loamy soils of Kasaragod, South Kanara. Apart from the increase in the number of functioning leaves, the palms showed significant increase in the production of female flowers and in the setting percentage resulting in higher yields. This treatment, however, was not as beneficial as a general dose of manure supplying nitrogen, potash and phosphoric acid. From the coconut nursery experiments it was found that the position of the nuts in the seedbed has no relation to the total germination, and that nuts having little or no water in them are not fit for seed purposes.

Studies of the broom-rape of tobacco are in progress. So far mechanical methods of control have proved more economical than chemical methods. The

transmissible nature of cotton sterility (small leaf disease) has for the first time been established. Cultures of ergot of rye are being grown on the Nilgiris for producing this valuable drug. Infusions of *Acorus* rhizomes, *Tephrosia* seeds and pyrethrum flowers are found to be efficient against aphids in a concentration of 1 oz. per gallon of water. Studies are in progress on the control of the sugarcane borer by the mass breeding of its egg parasite, *Trichogramma minutum*.

Powerful indigenous insecticide Investigations carried out by the Government Entomologist to determine whether the insecticides that are now difficult to obtain could effectively be substituted by any of the locally available plant poisons have resulted in the discovery of a powerful contact insecticide in the kernels of *Thevetia neriifolia*. A native of South America and the West Indies, this plant has been grown in India for many years. It comes up well in South India and is commonly grown as a hedge plant. Aqueous extracts of its kernel prepared by mashing or grinding and then steeping in cold water for 24 hours have been found to be highly toxic against a wide range of insects. Optimum strengths for soft and hard bodied insects have been studied. A strength of $\frac{1}{4}$ oz of the kernel in one gallon of water is enough to kill plant lice, thrips and leaf hoppers. Half an ounce in one gallon of water is required against the defoliating caterpillars like the moringa hairy caterpillar and the castor semi-looper, while one ounce of the kernel in one gallon of water is necessary for the control of mealy bugs and scale insects. To obtain maximum effect, the addition of soap equal in quantity to that of the kernel used is necessary. Plants sprayed by aqueous extracts of the kernel have been found to be immune from insect attack for short periods. No injury is done to the foliage when the concentration is less than one ounce per gallon. In addition to the kernel, the cake and oil of *Thevetia neriifolia* have been observed to possess toxicity of varying degrees. *Thevetia* oil has been found to act as a deterrent against termite attack. (*Indian Farming Vol. 3, No. 12, December 1942.*)

Gleanings

Chemical elements needed for plants Healthy plants, like good steel, need the addition of minute amounts of a number of chemical elements. Some of them are the same as those required for modern steel making, including manganese, molybdenum and copper. The story of these "micro-nutrients" was the subject of the address of Professor D. R. Hoagland, of the University of California, president of the Pacific Division, American Association for the Advancement of Science.

The need of plants for these minute traces of certain elements was completely unknown until a few years ago and even now it is not certain that the list of micro-nutrients is complete. Of most of them, only a few parts in a million of soil solution are needed to maintain plant health, yet without them the plant sickens and perhaps dies.

Lack of some of these elements produces plant diseases that might formerly have been ascribed to the attack of sub-microscopic viruses. Fruit trees in soils without zinc, for example, produce symptoms known as 'little leaf' and 'mottle leaf'. Most soils have sufficient quantities of the micro-nutrient elements for all practical purposes but where they are lacking it is important to detect which ones are short and to remedy the defect.

Bearing on this subject also are relations between the nutrition of plants and that of the human beings and animals that eat them. Some of the micro-elements in plants are of as great physiological importance indirectly to animal life as they are directly to the life of plants. This field of research is only beginning to be explored. (*Science, June 26, 1942.*)