

claimed for them and talc powder has totally failed to give any protection at all—as a matter of fact the number of insects and the percentage of damage in this lot was the highest; the substance seems to have a further disadvantage of damaging the gunny bags in which the grains are stored; the gunny bags had to be renewed more than once during the course of the experiment. Acorus powder and lime with creosote have given very encouraging results. These and other methods of storage are being tried again for another year.

Co-operation in Agriculture with special reference to sugarcane crop in Coimbatore District.*

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That Agriculture is the mainstay of the vast majority of the population in this country and that the prosperity of the country depends on the condition of agriculture and those engaged in it, are obvious facts which do not call for elaborate arguments to convince anyone. In a world of large scale business, the agriculturists are in need of organisation, and co-operation offers the most ideal form of organisation for them. Co-operation has worked wonders for agriculturists in countries like Denmark, Ireland, Canada and the United States. In India, till recently, co-operation among agriculturists confined itself to one aspect of the problem namely credit. Such a one-sided development had consequences which made themselves felt seriously in the great Depression which set in from 1930. Now it is recognised on all hands, that the rural problem, if it is to be tackled properly, should be tackled on all its fronts. Any attempt to improve the economic condition of the agriculturists must therefore include in its scope finance for production purposes, supply of requirements and marketing of produce.

On account of the circumstances of its origin and early history, the co-operative movement is still largely a credit movement but the lesson taught by the depression referred to above has had its effect and societies other than credit are being started in large numbers. Taking the position in the districts of Coimbatore and Nilgiris, there were on 30th June 1940, 725 societies in the former and 96 in the latter. Of these 586 and 72 respectively are credit societies while the rest are for other purposes.

The following classification is intended to give an idea of the nature of work done by the different types of existing societies.

No of societies classified.	Coimbatore district.	Nilgiris district.
1. Land Mortgage Bank	11	1
2. Central Bank	1	—
3. Supervising Unions	16	2
4. Audit Union	1	—
5. Language Federation	1	—

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6. Loan and sale and Marketing societies	6	1
7. Building societies	13	2
8. Stores - general	4	5
9. do. for mill hands	9	—
10. Students stores	6	2
11. Urban Banks and other limited liability credit societies other than salary earners	17	4
12. do. do. for salary earners	14	6
13. Agricultural Primary Credit societies.	586	72
14. Miscellaneous	40	1
	725	96
Total.	725	96

The best results have been achieved only by societies in the working of which both the Co-operative and Agricultural departments took joint interest. The aim of both the departments being the same, viz, increasing the income of the agriculturists, coordination of their activities is absolutely necessary and that such coordination yields the maximum results, has been proved by the limited experience gained so far. The Co-operative Societies gain immensely by making use of the results of years of patient research and labour put forth by the Agricultural department and that department has in the co-operative societies an organisation that enables it to propagate the results of its studies to a larger clientele in much quicker time and in a more efficient manner. An outstanding instance of such success is the Tiruppur Cotton Sale Society. What it has done for cotton, similar organisations are trying to do for potatoes in the Nilgiri hills and for groundnut, turmeric and sugarcane in Coimbatore district. The seed distribution schemes for potatoes and groundnut which the Agricultural department have taken on hand are sure to be of great help to the societies.

Taking sugarcane, one of the most important money crops, and in the improvement of which Rao Bahadur T. S. Venkataraman, the Sugarcane Expert, has achieved striking results, it is admitted on all hands that, on account of fluctuations in the price of jaggery, the sugarcane grower is often in a precarious position. From the year 1937 with the help of Government of India grants, attempts have been made in all sugarcane growing areas in the presidency to organise the growers on co-operative lines and to secure for them a greater yield and a better price for the yields. The Government of India has set apart a portion of the excise duty levied on sugar for distribution among provinces where white sugar is produced for purposes of assisting of the organisation and operation of co-operative societies among sugarcane growers so as to help them in securing fair prices and for other purposes directed to the same end. The Madras scheme covers a period of 5 years from the date of adoption and it is administered by the Registrar of Co-operative Societies, Madras, who will spend the grant through co-operative societies or unions of co-operative societies of sugarcane growers in factory areas. The Director of Agriculture will give the necessary technical advice to stimulate the cultivation of sugarcane. The scheme is meant

to help the unions and societies to do their work efficiently with the help of the Demonstrators and Inspectors of the Co-operative Department

The objects of the Societies and the Unions are—

(1) to introduce and grow varieties of cane best suited to the locality and factory ;

(2) to introduce early and late maturing varieties to feed the factory and to enable it to crush cane for as long a period as possible.

(3) to maintain a supply of vigorous seed material by adopting " short crop " method in different varieties found suitable to the locality.

(4) to adopt measures to protect the cane crop from insect pests and diseases.

(5) to take such measures as are recommended for improvement in the methods and for reduction in the cost of cultivation such as interculturing, manuring and irrigation.

(6) to concert measures to improve means of transporting canes to factories.

(7) to give facilities for the ryots to check weighment of cane at the factory and avoid delay in the disposal of cane etc.

and (8) to take measures to finance cane growers through co-operative societies at the right time for the purchase of seed, manure, etc. and for harvesting the crop.

In the Coimbatore Sugarcane Growers' Co-operative Union, Ltd. formed and registered under Madras Co-operative Societies Act VI of 1932, there is an organisation to help the cultivation of sugarcane. The Union has started work in January 1936. The Government have been pleased to place the services of an Agricultural Demonstrator and a Maistry, besides a subsidy of Rs. 1,000 towards purchase of implements, sugarcane setts and manure. So far 252 members have joined the union and subscribed Rs. 8,890 by way of share capital. The Union has introduced high yielding varieties of sugarcane namely Co. 413, Co. 419 and Co. 421 recommended by the Agricultural Department. It purchased 40,000 setts of Co. 419 and Co. 421 from the Tudiyalur village and supplied them to members in Thoppampatti and Jangamanaickenpalayam villages. The Union had also supplied to the members suitable manures worth about Rs. 6,000. It has financed the members to the extent of Rs. 22,434 for meeting their cultivation expenses. Ploughs, cultivators, bund-formers and other implements have been purchased by the union from the Government subsidy of Rs. 1,000 and were placed at the disposal of the members of whom as many as 50 have utilised them to their best advantage.

With the introduction by the Agricultural Department of high yielding varieties of canes like Co. 419 and Co. 421 and using proper manure, there has been a marked increase in the average yield per acre followed by an extensive cultivation of sugarcane crop especially within the last 3 years. The area under sugarcane cultivation has almost doubled, resulting in over-production. This and other reasons have led to a fall in the price of

jaggery. The average yield of jaggery has also increased from 30 to 35 *pothies* (one *pothy* = 280 lb.) per acre. There has not been a corresponding demand for it. Even the little export from Coimbatore of lump jaggery to Bombay, Sholapur, Hyderabad and Calcutta has decreased of late. By selling jaggery at Rs. 6 per *pothy*, barring incidental expenses, the ryot can, hope to get only a margin of Rs. 3 per *pothy*. If the cultivation is extended the cane cultivator stands to lose heavily.

By way of a complement to the activities of the Sugarcane Growers' Union, with a view to give a greater income to its members and other sugarcane growers it is proposed to organise a sugar factory on co-operative basis, to convert the surplus sugarcane into white sugar. Fifty per cent of the canes grown in this district will be consumed at the factory for conversion into sugar.

Calculated on a modest basis, the ryots will get an extra return of about Rs. 6 lakhs every year even if the price of sugar goes down to Rs. 27—8—0 per bag of 2 cwts. It will be gratifying to note that this will also yield to the Central Government an excise duty of about 2 lakhs.

The necessary finance for running a sugar factory on a large scale has to be raised by way of share capital and loans from the Coimbatore District Urban Bank. The Coimbatore Sugarcane Growers' Co-operative Union has enthusiastically come forward to work up the scheme proposed. The proposal for the establishment of a Co-operative sugar factory in which the cane growers will be enrolled as members, was taken up at a meeting of the Board of Directors of the Union and important cane growers. The Registrar of Co-operative Societies, Madras, The President of the District Urban Bank and the Deputy Registrar of Co-operative Societies were present at the meeting. The proposal of establishing a sugar factory was discussed in full and the following decisions were arrived at.

(1) That a Co-operative sugar factory consisting of cane growers should be started.

(2) That ryots should take up 3000 shares of Rs. 250 each.

(3) The share amount may be paid in full in cash. In the alternative a share holder may pay Rs. 100 in cash, furnishing a security of unencumbered immovable property for the balance of Rs. 150.

(4) that every ryot should undertake to cultivate and supply to the factory for each share held by him, canes grown over an acre of land for being crushed in the factory.

(5) When 1500 shares have been subscribed for, by the ryots, a separate society will be registered to run the factory. So far 850 shares have been subscribed and earnest attempts are being made to reach the goal.

The starting of this sugar factory will be the signal for launching other schemes to help sugarcane growers in other areas. It is under contemplation to start co-operative societies for sugarcane growers at Unjalur and Udumalpet to ensure steady supply of canes to the factory from the feeder

societies. The issue of loans on produce, and the marketing thereof will be left with the Sugarcane Growers' Union, to which these societies will be affiliated in due course.

The necessary finance for the enterprise is to be derived from the shareholders and the financing bank, but the co-operation of the Department of Agriculture and Industries are essential for launching the scheme and working it successfully. Sugar factories in S. India are few in number and those, excepting one, are joint stock concerns. The example of the Vuyyur Co-operative factory has demonstrated the possibilities of a Co-operative factory even under difficult circumstances: With much more favourable conditions, a co-operative sugar factory in Coimbatore is bound to thrive well.

ABSTRACTS

The application of genetics to plant breeding. J. B. Hutchinson *Jou. Gen.* 40: 271.

There can be no response to selection unless the material is genetically variable. The relation of variability to rate of change under selection and the effect of selection in reducing variability are therefore fundamental factors in breeding theory. The examination of unselected crop populations has provided information on the equilibrium between selection and variability that is established in nature and it appears that variability persists at a high level. It follows that natural selection does not naturally result in uniformity and the stability of such mixtures must be due to selection and not to genetic uniformity.

The records of breeding projects with sea Island cotton show that it is in practice impossible to achieve genetic uniformity, even when it is deliberately sought. Variance may be greatly reduced, but it persists in some measure even in the most closely bred strains. If the stability of unselected populations is due to selection and not to genetic uniformity the breeder may regard purity as a secondary consideration, and a new approach to his problem is possible.

The problems involved in the choice of material for selection have been better studied than most others that face the breeder. For most crops the areas of high variability are known. Now that it is recognised that hybridisation is only a means of increasing variability and is a preliminary to selection and not a substitute for it, breeding programmes are better planned. No one nowadays wastes his time creating variability when it exists in his neighbour's fields. Where hybridisation is necessary genetic investigations have marked off the dangerous areas where cytological abnormalities and inter-specific breakdown require special treatment, and in some cases, as in cotton sound guidance can be given and the order of its magnitude likely to be found in hybrids of any given type.

Studies of the rate and magnitude of change that can be induced by selection have an obvious bearing on breeding policy, but little information is available beyond Students' analysis of Winter's selection experiments, Harland's account of the Mount Serrat Sea Island cotton and Hutchinson and Kubersingh's analysis of the effect of selection on Malvi cotton. A preliminary enquiry into another aspect of the problem of the mass action of genes is Anderson's recent calculation of the limiting effect of linkage on gene assortment in distant hybrids. This has an interesting bearing on the rate of re-establishment of the species balance in Harland's back crossing method of exploiting interspecific hybrids. S. V. P.