

season, its rainfall and distribution, the ryots would be in a position to adjust their cropping definitely with reference to their needs of food, fodder and cash. It has been found by experience that when there are reports of heavy rainfall in the West and North-West as in Mahabaleswar and Nagpur adequate rainfall can be expected in this tract immediately after. In the same way when there is heavy fall recorded at Masulipatam and Cocanada there is sure possibility of rains in this tract. The early or late start of the season has its own bearings on the situation since an early one facilitates the raising of two crops. The raising of nurseries can be adjusted so that the crops are planted at the right time. Sometimes heavy rains are received in February and March. An indication of these in advance should give the cultivator a chance to manipulate his harvest and curing of the tobacco in such a way as to incur minimum loss. It is therefore, not out of place to emphasise here the necessity for starting meteorological sub-stations in such important tracts.

Conclusion. In conclusion, it may be said that this tract enjoys a more favourable condition of weather and rainfall than other dry-land tracts. Yet it is left to us to use our ingenuity to extract the maximum benefit out of the indulgence of nature. We have to make efforts to keep the soil in its right condition, sow the best and give the best of our attention so that the normal out-turn is assured invariably. Any complicated or elaborate system of manuring is out of the question particularly with artificials. Systematic and adequate manuring with organic manures like cattle manure, sheep manure or cake and bones have given the best results. Crop improvement work in such a tract should proceed on the following lines:—Crops should be bred to (1) withstand heavy rainfall and long drought; (2) give immunity or resistance to diseases and insect pests; (3) come into maturity at suitable seasons (4) conform to the quality required in the markets and (5) give adequate yields to make their cultivation pay a handsome return.

Seed Testing.

An important Agricultural Practice.

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Introduction. What is it that every gardener or farmer would most desire? The ready answer to this question will doubtless be one word 'success'. Success in good farming or gardening will mean the production of the largest, the handsomest, the healthiest and the most vigorously growing plants yielding the maximum produce which will give an abundant return for the labour and expense of running a farm or a garden. For, 'a product properly produced is already more than half marketed'. The first and the foremost criterion is the purity of the seed for its species and the strain or variety the farmer which intends to grow. For example, if it is to be *Co₂ Cambodia*, he must make sure that it is *Co₂ Cambodia* and nothing

else, for it is a very common thing to find inferior cotton seeds like those of *Pulichai* mixed up with this. The next point to be considered is that the seed should be free from other crop seeds. A sample of cotton may contain seeds of *tenoi*. A third point to be noted is it should be free of weed seeds and in this connection no amount of emphasis can be laid on its freedom from seeds of weeds of a parasitic nature such as those of *Striga*, *Orobanche*, *Cuscuta*, etc. Another point for consideration is that the seed sample should be free from mechanical impurities such as mud, bracts, bracteoles, etc. The most important point, however, is that every seed sown should sprout and grow into a healthy plant. There should be absolutely no gaps in the field. Success in farming, therefore, centres to a great extent round the seed. The farmer must see that the seeds he consigns to earth are endowed with a maximum power of life. If one wants a hundred per cent result one must plant seeds that rate 100 in the scale of life in a soil that rates 100 in the scale of fertility.

In order to know the true value of seeds that one is going to sow, one must test them for their vitality. This is known as "seed testing." Since 1930 this work is being done by the Lecturer in Botany, Agricultural College, Coimbatore, for the department and the public on scientific lines and so far more than 1,200 samples of seeds of different kinds have been tested. Samples of seeds have been received as for example from the cultivated cereals, pulses, oil-seeds, the green-manure crops such as sunnhemp, *dhaincha*, (*Sesbania aculeata*) *kolinji* (*Tephrosia purpurea*) *pillipesara* (*Phaseolus trilobus*), cotton, tobacco, tea etc.

Methods of testing. One would certainly be interested to know how seed testing is done. In the laboratory seed testing is done in what are called "germination trays" which are made of zinc sheets and the test is carried on in the incubator under a constant temperature. The tray measures 6" x 6" and is 2" deep with perforations on all the sides for aeration. Inverted into the tray is a framework of wire gauze across which are laid two strips of filter paper cross-wise, so that these touch the bottom of the tray where water is kept. Over this framework a square piece of filter paper with hundred square rules on it is placed. This is kept constantly moist by the connecting strips of filter paper, placed cross-wise. Since the tray is kept in an incubator, there is no need to cover the tray with a lid. But, if the test is carried outside the incubator, the tray has to be covered with the lid. So all the ideal condition for germination are here, i. e., moisture, air, constant temperature and darkness. Ordinary seeds like paddy, sorghum, etc., are sown on wet filter paper after giving the seeds a previous soaking in water overnight. Hundred squares are ruled on the filter paper and countings are taken from day to day till the whole set finishes its germination. Seeds like cotton or tea are sown in moist sand in trays. Holes are made in the sand and the seeds are dibbled into them and here also each tray carries hundred seeds. It is quite easy for even a layman to practise seed testing. Supposing a farmer wants to test his seed paddy before purchase, he should

get samples from 3 or 4 different merchants, taking care to obtain random samples from the different portions of the seed containers of each of these merchants. Two hundred seeds should be counted out from each sample irrespective of their size, shape, appearance, colour, etc. These should be sown in duplicate in clean moist sand in shallow earthenware pots provided with drain holes and labelled. One hundred seeds should be arranged in each pot in 10 rows, each row carrying 10 seeds. Separate counts should be taken of the germinated seeds from day to day for about a week and recorded. In this manner the total germinating capacity of each of these samples is determined. By doing so, not only the germination capacity of each sample is easily determined but the speed or energy of germination is also noted. If a sample shows 90 per cent germination in five days and another the same percentage in ten days it is obvious the former is a better lot than the latter.

Observations in this laboratory go to show that the germination speed is generally very high in almost all our cultivated crops provided the seeds are of good quality. Ordinarily even at the first counting which is done 24 hours after sowing, a good lot generally records as much as 70 to 80 and very often the test is completed on the third day. Counts are taken of seeds where the radicle (the primary root) is seen emerging out. These are the healthy seeds which are said to be germinating. It is very infrequently that there is need to carry on the counts to the fourth day. In poor lots, however, one has to wait up to 10 days. There are also slow germinating seeds such as tea, sugarcane, onion and kolinji, which need a longer period. In the case of *kolinji* the slow germination is due to its hard coat. In cases where seeds are hard coated as in many of the Leguminosae and in seeds with hairs as in cotton it is recommended that for hastening germination the seeds should be specially treated. In the case of cotton, the treatment usually adopted is stirring the seed with concentrated sulphuric acid for about 3 to 5 minutes, filtering the acid and throwing the seed into rain water. The acid treatment chars the fuzz of hairs which are easily washed off in water. This process of delinting does not interfere with germination in any manner. In the case of *kolinji* two methods have been tried viz., (1) the treatment with concentrated sulphuric acid, and (2) rubbing the seeds with glass paper by hand. The latter method has always given better results and is the only method that is now adopted. Tea seeds which are hard coated and have low viability are treated like *kolinji* with glass paper. They germinate very satisfactorily giving us an increase of about 20 per cent over the untreated seeds. Another method advocated is to steep the seed in boiling water for five minutes dry and then sow. It is explained that the hardness of the seed coat in seeds like *kolinji* serve a purpose. In adverse conditions the ordinary seeds are destroyed but hard seeds survive the period and propagate the species when favourable conditions set in and therefore it has been argued that hard seeds should be regarded as germinable for purposes of declaring the percentage of

germination capacity of a sample. Under the rules of the International Seed Testing Association a compromise is adopted. One half of the hard seeds is added to the number germinated for calculating the real value of the sample. At the end of each test, the total number germinated, the number attacked by mold and the number of hard seeds are also given.

Conclusion. In a vital matter like purchase of seed the farmer looks for qualities such as colour, size, lustre, plumpness and sometimes smell as in coriander, paddy, etc. No doubt, these are points worthy of consideration, but appearance is very often misleading and what is really wanted in addition to good appearance is a good performance when they germinate, for 'handsome is that handsome does'. So seed testing on scientific lines is very essential. Seed testing has been going on in the Western countries for more than half a century and two of the world's greatest seed testing stations are at Zurich in Switzerland and Copenhagen in Denmark. Very valuable research work in seed testing has been done at both these stations. There are seed testing stations established now in the United States of America, Great Britain, Ireland, Australia, etc.—in fact in almost all the civilised countries of the world.

This is an age of commercial competition and if the Indian farmer is to be progressive he must eliminate every element of chance in agricultural practice so as to strengthen his position in the universal struggle. Though a creature of habits and very conservative by nature, the Indian farmer must realise the present day conditions and rise up to the occasion. It is said that agriculture was a fairly easy task a hundred years ago when seasons were more normal, prices of seeds and other commodities low and labour much less expensive than now. The state of affairs is entirely different to-day. The Indian farmer must copy the farmer of the Western countries and adopt scientific methods and see that he reaps the maximum profit from his labours. One of the most important considerations should be that his seeds are pure both for the species and the strain or variety which he intends to grow, and free from impurities such as chaff, mud, weed seeds and insect or fungus attacked seeds or plant parts and also show a high percentage of germination and vigour. Hence the motto should be never to sow seeds without testing them for their vitality and purity.

SELECTED ARTICLE

America's New Deal in Agriculture.

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In 1929, things began definitely to go amiss with the American farmer. Since the World War, 1914—18, agriculture has been existing in a state of fluctuating prosperity, trying to keep pace with the crazy finance of the industrial world in America. The policy of high tariffs, high prices, and heavy over-production, combined with a shrinking overseas market, brought the economic depression in its train, and the first man to feel the effects was the farmer. The first reaction was to put into practice the idea that the way to pay bills was to produce