EXTENSION

THE FARM AND FARM HOME MAGAZINE

MAY, 1961

SPECIAL SEED NUMBER

The seed contains the germ of life, a new plant in miniature, which grows and in turn produces more seeds. The seed is the basis of agriculture. On the awareness among our farmers of this important tool with which to fight low yields depends our farm progress. Hence this Special Number, dedicated to Better Seed.

EXTENSION

THE FARM AND FARM HOME MAGAZINE

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IN THIS ISSUE

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THE WORLD SEED YEAR

PROGRESSIVE farmers all over the world consider good seed as one important factor for taking bigger harvests from land. Improved seed is in fact the cheapest means available to all farmers for raising farm production.

It is for focussing the attention of the world's farmers on the use of good seed that the Food and Agriculture Organization of the United Nations decided in 1957 that all member countries launch the 'World Seed Campaign' in 1961. At the request of the F.A.O., all delegates of the member-nations agreed to organize National Seed Campaigns in their respective countries. This is how India too is observing the World Seed Year this year.

The National Seed Campaign in India is being conducted both at the Centre and in the states.

The purpose of the Campaign is to introduce improved crop and plant varieties, intensify plant breeding research, multiply high quality stock seeds, formulate seed certification schemes, organize seed distribution and trade, adopt seed acts and other rules and regulations, exchange improved varieties with other nations and also with other states within the country.

In India today, as a result of patient research in the various research stations and institutions, a large number of improved varieties of crops have been evolved. After the improved seed has been tested in farmers' fields, the seed is recommended for wide distribution among farmers.

An improved seed is first multiplied at the research station itself or at the district agricultural farms. This seed, known as the foundation seed or the nucleus seed, is distributed to the Block or sub-divisional seed farms for multiplication and distribution to various *panchayats* or cooperatives under the National Extension Service Blocks. The *panchayat*, with the help of the Agricultural Extension Officer and the Village Level Worker, gets the seed further multiplied through registered seed growers.

Various types of incentives are given to the registered seed growers to meet additional expenses which they have to incur for such operations as rogueing, and also a premium for the quality of the seed raised. This seed then passes to farmers either directly or through cooperatives or marketing societies.

Today, nearly 4,000 such seed farms have been established in units of 25 acres each, covering a lakh of acres in the country. Uttar Pradesh leads with 677 such farms, followed by Maharashtra which has set up 573.

As a part of the National Campaign, a Paddy Seed Multiplication Workers' Conference was organized in Tanjore in April last in Madras State to chalk out ways and means of multiplication, distribution and quality control of seed.

Seed testing has been given special importance in connection with the World Seed Year. The seed-testing programme has been organized in the seed-testing laboratories at the Indian Agricultural Research Institute, New Delhi, and at Ludhiana. A seed-testing training programme is also being organized for the benefit of officers at the state and district levels.

India's Seed Campaign is being actively assisted by such missions as the Rockefeller Foundation, the Ford Foundation and the Technical Cooperation Mission of the United States.

Information programmes have been taken up in the states for educating the farmers on the importance of sowing seeds of improved varieties. EXTENSION also takes this opportunity of placing before its readers the important aspects of good seed and what they stand to gain by using quality seed.

we need a seed industry now

By A.A. JOHNSON
Rockefeller Foundation
New Delhi

FROM the earliest days, farmers have recognized that seed is essential for food production. Without seed, there would be no agriculture. Yet, the organized growing and distribution of improved seed is one of the newer agricultural industries in the world.

As countries advance in crop output per unit of land and per man-day, a high quality of seed of improved varieties becomes an urgent need. A study of farming as it exists in the world today proves this statement.

In many of the countries of the world, the higher the yield per acre and more advanced the agriculture, the greater is the dependence of the farmer on the highly developed improved seed industry. Progressive farmers seldom plant seeds collected from their own crops. They buy the seed from seed specialists.

In northern Europe, particularly in Scandinavia, Holland and West Germany, and the United Kingdom, seeds of nearly all the crops are purchased from a highly-developed seed industry. It will be interesting to note that in the 17th century, the average crop yields in Europe were very low. Now, the crop yields in these countries are among the highest in the world and are still going up.

In the United States, Canada and Japan, yields are high and are on the increase, with the farmers relying on a highly-developed seed industry to a great extent for their needs year after year.

This situation is not an accident. Producing quality seed is not just another phase of improved farming as it is commonly assumed in India. It requires high technical knowledge and ability to produce high quality seed. In some of the advanced countries, where the standard of agriculture is high, some of the best scientists have devoted a lifetime of studies and work to various aspects of the seed industry. The very best farmers raise the seed. Cleaning, storing, treating and testing of seed are carried out by specialists who make these their life's career.

For developing a good seed industry, you need :

1. Improved crop varieties developed by research.

2. A developing agricultural economy.

3. An increased use of chemical fertilizers, plant protection measures and other factors which step up crop yields.

4. An awakening among farmers which will make them recognize that crop yields need not always remain at a low level.

All these conditions now apply to India and the time is ripe for setting up and developing an Indian seed industry. A seed corporation has already been set up at the Centre which will finance and guide the hybrid maize-growing units in the states. The corporation will also produce and distribute single cross planting stocks to the seed-growers. The seed-growing units will be generally private farms or may operate as cooperatives or corporations.

Land units of about 500 acres each are needed for this purpose. These units can be individually-owned units or organized seed-growing villages with all the growers producing seed of a particular hybrid. Seed farms, in this context, will have to be treated as a semi-industrial operation, like a factory, rather than just farms.

Hybrid *jowar* will soon be available to farmers. This will require seed multiplication in large seed-growing units. Crops such as wheat, gram and groundnut will also be added to these units with hybrid maize or hybrid *jowar* as the main seed crop.

In the seven Package Programme Districts, it is necessary now to organize larger land units in selected villages near Government Seed Farms for seed production. This way the supply of certified seed can be greatly stepped up. Several such seed-growing villages are already working efficiently.

Seed cleaning, treating and packing facilities will also be available to the units growing hybrid maize and hybrid *jowar* as well as those in the Package Programme Districts. Seed-testing laboratories will soon serve the Package Programme Districts and the hybrid-growing seed units. Seed certification programmes are also being developed.

There is need for cooperatives or individuals to take up the seed industry, as has been done in Kashmir regarding vegetable seeds to supplement the efforts of the Extension staff and the Agriculture Department.

It will also be good for farmers to remember that high quality seed alone will not be all that is needed to increase production. In modern farming, a right combination of factors such as fertilization, water and crop management and plant protection measures and the use of high quality seed of improved varieties only can lead to higher production.

Disease-free SEED

Disease-free CROP

By A.C. JAIN
Plant Pathologist
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WHEN you sow a seed, it is quite likely you are also sowing a plant disease with it! This happens because of the seed itself carrying the germ of the disease in many cases.

When you sow such a seed, most of it is destroyed by the disease before it comes up. The plants that come up will be a danger to you and your neighbours as the plants may be infected with a disease that can spread and do a lot of damage.

The seed through which plant diseases spread may be the 'true seed' or the 'vegetative seed' which is a part of the plant such as stem or leaf and used for the same purpose as the true seed.

The 'pathogen' or the disease-producing germ can go with the seed in these three ways :

MIXED WITH THE SEED

In some cases, as in the earcockle disease of wheat, hard galls containing the disease-producing germ get mixed with the seed. In other cases, bits of the diseased parts of plants similarly get mixed with the seed. When such seeds are sown, the disease appears in the field.

STICKING TO THE SEED

In the case of diseases like the covered smut of *jowar*, the spores of the disease stick to the surface of the seed at the time of

threshing. Similarly, the bacterium which causes the black arm disease of cotton remains in the fuzz. In the case of tomato, the bacteria which produce the canker disease remain on the seed surface. So is the case with the germ causing seedling-blight in groundnut. The spores of *Helmintho-sporium* disease in barley and *Piricularia oryzae* in paddy remain in between the seed and the glumes.

INSIDE THE SEED

Loose smut of wheat is an example of the disease-producing pathogen (in this case a fungus) remaining inside the seed. When the seed is sown, the disease appears. In the case of crops where vegetative seeds are sown, the disease germs remain inside the part that is used as seed. When the seed material produces new shoots the pathogen also grows with it. Red-rot and smut in sugarcane, foot-rot of betelvine and ring-rot of potatoes are other examples.

Certain diseases are caused by virus. Particles of this virus are found in the vegetative tissues and sometimes, as in the mosaic disease of bean, are present in the seed also.

The seed being the carrier of some of the diseases, the farmer should not use any seed or seed material from a diseased crop.

If this is not possible, he should select the best seed or seed material available with him for sowing. This is more important in the case of crops multiplied vegetatively. In sugarcane, for example, the farmer should avoid taking seed from a field in which red-rot or smut had appeared. If he finds that this is not possible, he should select only such canes as do not show even the slightest sign of the disease, for preparing the setts.

So also with potato. If he finds that he has to use seeds from a field in which a virus disease has appeared, he should remove all the affected plants and burn them. To be able to do this, it is necessary that the farmers know the symptoms of the disease as, for example, the mottling of leaves caused by potato virus disease. He should also spray his crop with a fungicide from time to time to protect it from new infection.

However, once the tubers are removed or when seed tubers are bought from outside, there is no easy way of telling whether the seed is diseased or not. Of course, in the case of potatoes, the Government helps farmers by making available seed, certified as disease-free from seed-dealers.

FREEING THE SEED OF DISEASES

When it is not possible to obtain seed from a disease-free crop, it becomes necessary to free the seeds from the disease-producing germs before sowing. This, however, is not possible if the disease germ is found inside the seed. In this case, seed from disease-free crop is a must. Freeing the seed of disease if the germ is externally borne is, however, easy.

There are some simple and cheap methods of making the seed free of such disease germs.

MECHANICAL METHOD

The eelworms which cause the ear-cockle disease of wheat form hard galls which get mixed with seed. Since these galls are lighter than the seed, they float if put in a 20 per cent salt solution. Thus they can be separated from the seed. If parts of diseased plants are also mixed with seed, they can be separated out by blowing or in some such easy way.

TREATING WITH FUNGICIDES

When the disease-causing germ is on the outer surface of the seed, it can be easily killed by treating it with a fungicide. It is worthwhile to treat the seed thus before sowing even if the seeds are disease-free. This will help protect the young germinating seedlings from the attack of other organisms

found in the soil, as the seed gets a coating of the fungicide. Vegetative seeds such as portions of a stem or tuber should be similarly treated with a fungicide before sowing.

The fungicides available in the market are of these four kinds :

Sulphur compounds

Copper compounds

Mercury compounds

Organic compounds including antibiotics.

Sulphur in the form of a fine dust has been popular for treating *jowar* seed against grain smut. These days organo-mercurial compounds which are more powerful are used in its place.

Bordeaux mixture is the best-known copper fungicide, as a spray or as a seed-dip. These days the less toxic fixed copper compounds are being widely used. Copper fungicides are used generally for spraying on the foliage of crops.

Among mercury fungicides, there are two types—inorganic (mercuric chloride and mercurous chloride) and organic preparations. The latter are more commonly used as they are more effective.

Mercury fungicides, however, are deadly poisonous to man and animal, and unless carefully used are dangerous to handle.

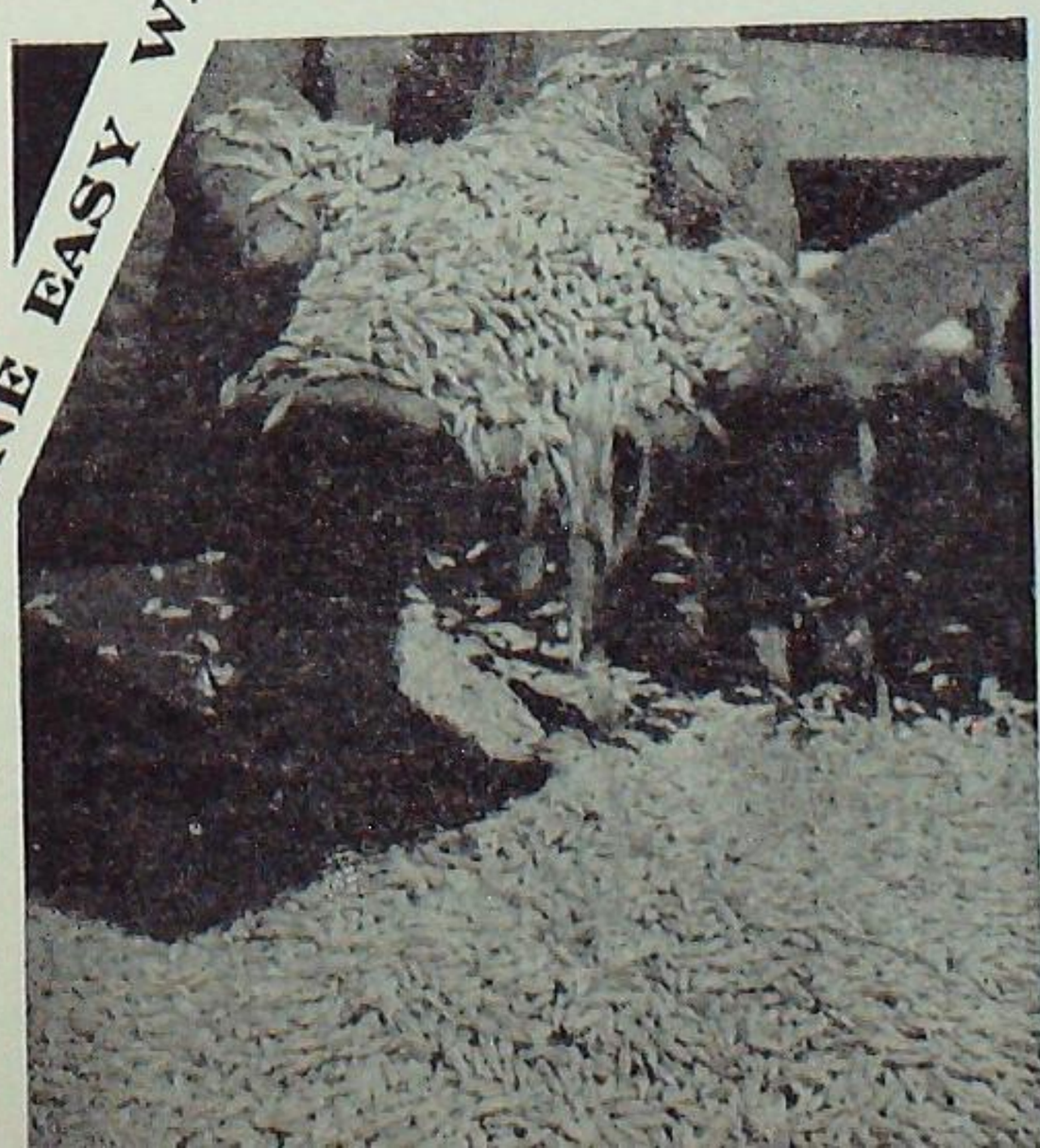
Organic fungicides have now been developed for treating seed, foliage as well as for treating soil, and are safer to use.

These fungicides offer to farmers a good way of freeing the seed from disease-producing germs.

Plant Protection Organizations in all the states stock fungicides for supply at cheap rates to farmers. Thus at a small cost, it is possible for farmers to treat their seed or seed material before sowing, and raise disease-free crops.

FARM OUTPUT UP

ONE EASY WAY OF TAKING YOUR



By C. HANUMANTHA RAO
Deputy Director of Agriculture
Eluru, Andhra Pradesh

IMPROVED seed has been the most encouraging way of increasing farm production and farm income.

It is the improved seed that gives a uniform germination, leading to a uniform stand of the crop which helps easy irrigation; gives extra yield with least harvest time loss; yields better quality and a uniform produce, fetching a better price in the market. Several improved varieties have been specially bred to resist pests and diseases as well.

Improved strains yield high; you can take your farm output up by 10 to 15 per cent by growing improved varieties alone. Improved varieties have been evolved to suit different soil and climatic conditions. Such varieties are available in millets, pulses, oilseeds, cotton, sugarcane and other crops you grow.

The crop breeder in Andhra Pradesh, like in other states, is continuously at work evolving new varieties which possess all the desirable traits. When they prove, through trials, to be good, they are multiplied and distributed to farmers.

Under field conditions, a new variety given to farmers does not remain pure for long. Due to several causes, the seed soon gets mixed with the seed of other varieties or of weeds, and has to be replaced by a new lot.

Hence, seeds of new varieties have to be multiplied continuously and in large quantities not only for distribution to new areas, but also for replacing the seed in the old areas.

The quantity of seed of a new variety produced by the plant breeder at the Agricultural Research Station is very small. This is but the 'foundation' or 'nucleus' seed which has to be multiplied in seed farms on farmers' holdings. The seed farms have not only to multiply the foundation seed, but also to supply it in a pure form and in good condition.

Till 1941, only a limited quantity of seed could be distributed by the Agriculture Department of Andhra Pradesh to the farmers. In 1942, because of a rice development scheme, seed multiplication was taken up on a large scale. In 1943, the scheme was further extended to cover more area. Year by year, the work has been expanded, and today, 75 per cent of the rice area in the State is planted with improved seed.

MULTIPLYING SEED

In the State, multiplying seeds of improved varieties is done in these three stages :

1. The Agricultural Research Station evolves a new variety. This is the foundation or nucleus seed. The Station also keeps a seed stock of this variety.

2. The nucleus seed is grown and multiplied in 'primary' seed farms which are located in farmers' holdings. This is the 'primary' seed.

3. The primary seed is further multiplied on secondary seed farms, which are again located in farmers' holdings.

The 'secondary' seed is then distributed to farmers for sowing. The agricultural Extension staff supervises the work in both the primary and secondary seed farms.

Every National Extension Service Block in the State has seed farms now. These produce seed considered equal to nucleus seed. This seed is multiplied on secondary seed farms located on farmers' land.

SEED FARMS

Seed farms, whether primary or secondary, are carefully selected. Care is taken to see that the farm has good irrigation and drainage facilities, and there is no danger of failure of crops. From nursery stage to harvest, the Extension staff keeps a watchful eye. They take special care to see that the seed does not get mixed with other seed in nursery beds. 'Rogueing' is done in the standing crop at all stages. Pests and diseases are checked in time. Threshing floors are prepared with care, and tools and containers such as winnows, sieves and gunnies are carefully examined and cleaned every time they are used.

Thus, every attempt is made to get a seed that is pure. Purity is tested ; so also is germination, before the seed is bought from the owner of the seed farm.

The seed farm owner gets a ten per cent premium over the local market rate for the seed produced and in addition, four rupees an acre as rogueing charges. The seed is sold at the local market rate plus 50 per cent of the premium paid to the grower.

The quantity of seed to be purchased from seed farms is based on the principle that seed should be replaced once every three years.

STORING SEED

The quality of a seed depends upon its germination power and this in turn on how well the seed is stored. And since seed has to be stored for some time before it is distributed, care should go to storage of seed too.

Seed is commonly stored in gunnies. This way, seed absorbs moisture, especially if it has to pass through a rainy spell. If the moisture absorbed goes over a certain limit, germination is affected.

Experiments at the Research Station at Samalkot, Andhra Pradesh, have shown that seed stored in metallic (zinc bins or kerosene tins) or glass receptacles stays good even for ten months ! Compared to this, seed stored in gunnies—single, double, triple and even four-fold—begins losing the germinating power from the fifth month onwards. Storing in bamboo basket bins or in straw twist bundles is better than storing in gunnies, but not as good as storing in zinc bins or kerosene tins.

This finding is important to farmers in the Godavari delta. They harvest the second paddy crop in May, but find it of no use keeping the seed of this crop for sowing in December of the same year. Hence as a rule, they raise a seed crop between June and October. Metal bin storage can help them solve their difficulty.

Of course, seed stored in metal bins or tins will need a longer soaking for sprouting. But this is not a serious difficulty. It will also be good if farmers remember that if they can 'sun' the seed at intervals, many of the storage defects can be checked.

TESTING GERMINATION

It is always better to test the seed for germination before the actual sowing of the seed in the nursery or field. For this purpose, a small sample of the grain is drawn and a germination test is conducted in a tray. If over 90 per cent of the seeds germinate in the first four or five days, the seed is satisfactory.

SEED TREATMENT

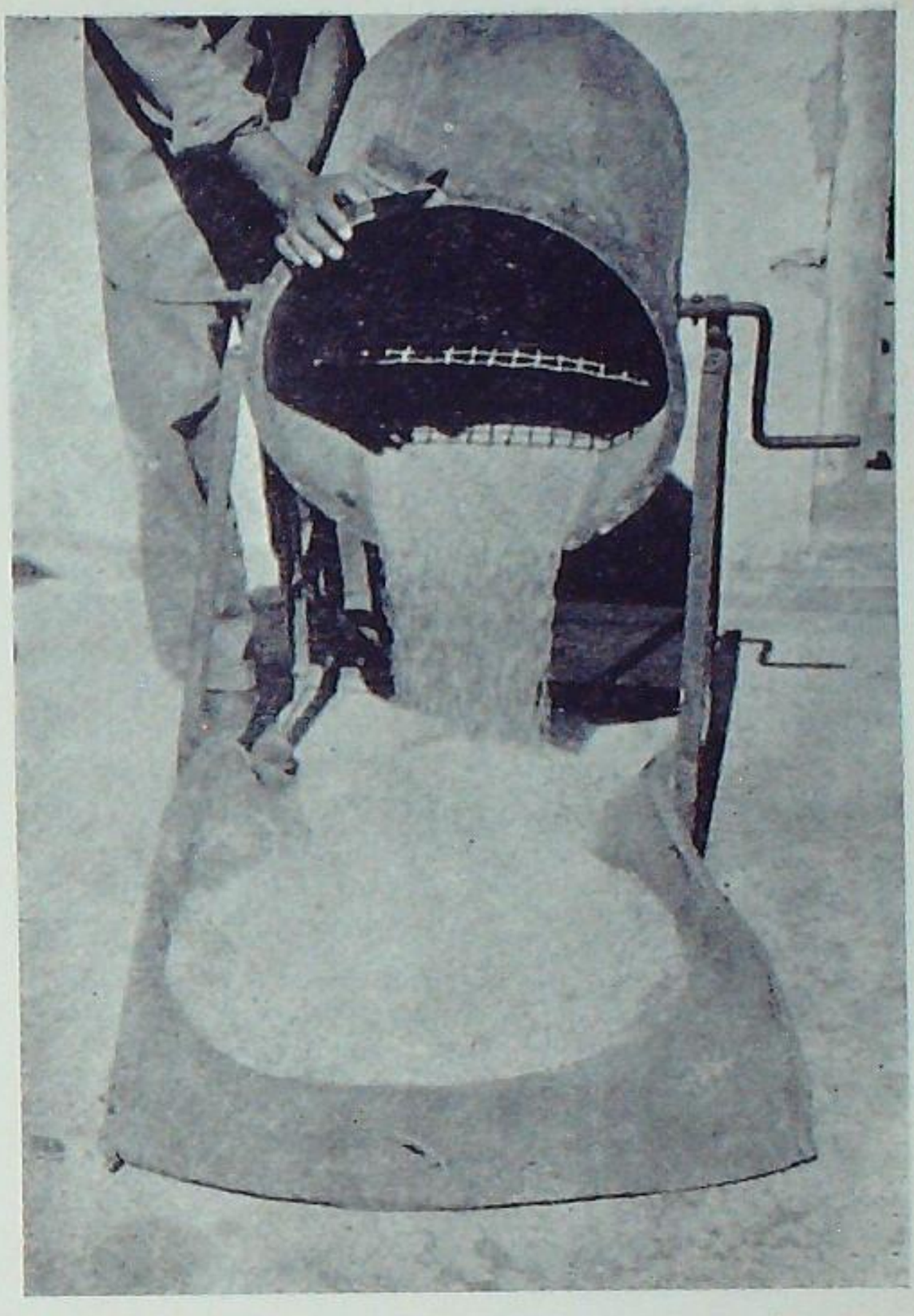
To get over the difficulty of seed-borne diseases like foot-rot of paddy and smut of *jowar*, the seed should be treated with chemicals. Treating paddy seed with an organo-mercurial compound and *jowar* seed with sulphur is already popular with farmers.

Where the seed has a hard coat as in wild indigo and *Prosopis*, the percentage of germination can be increased by hot water treatment.

IN THE CASE OF FRUITS

Seed or seed material is as important in fruits as it is in field crops. The seed or plant material selected from the parent tree has to be carefully handled in storage and in the nursery.

Many fruit seeds need to be sown as soon as they are collected from ripe fruits. If delayed, they lose their 'viability' (power of germination). The mango is an example. In citrus, if the seed is allowed to dry and then stored, it will not germinate. The guava, papaya, avocado, jack, roseapple, *amla* and vegetables like brinjal, tomato, *bhindi*, lablab and gourd—do not lose their viability



Seed-treatment may mean a little more labour for you, but it always pays

within about a year, and hence can be stored for sowing in the next season. Curry leaf seeds should be sown as and when the fruits ripen.

All care should be taken to store the seed material properly in air-tight containers in a cool, dry place.

SEED CARE

Seeds get mixed up in seed-beds. Though dry seed-beds are better in many ways, in certain areas, they are a good place for seeds to get mixed up. Sometimes, certain practices followed by farmers also help seeds to get mixed up. In the delta area, for example, animals are generally tethered in nurseries for manure and are fed on paddy straw. The odd grains in the straw fall off and germinate in nursery beds along with the good seed sown.

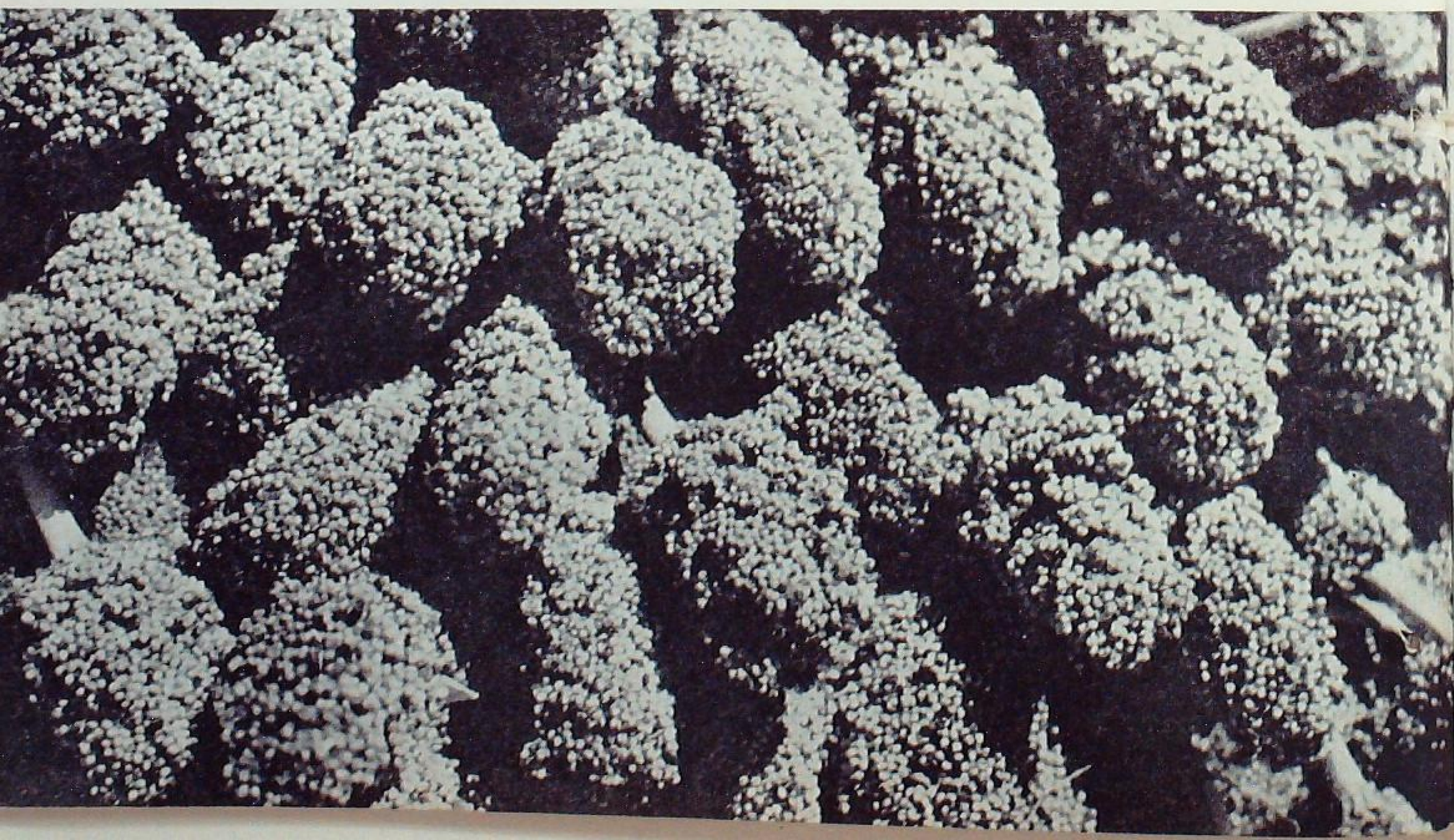
A good seed gives a higher yield and quality produce

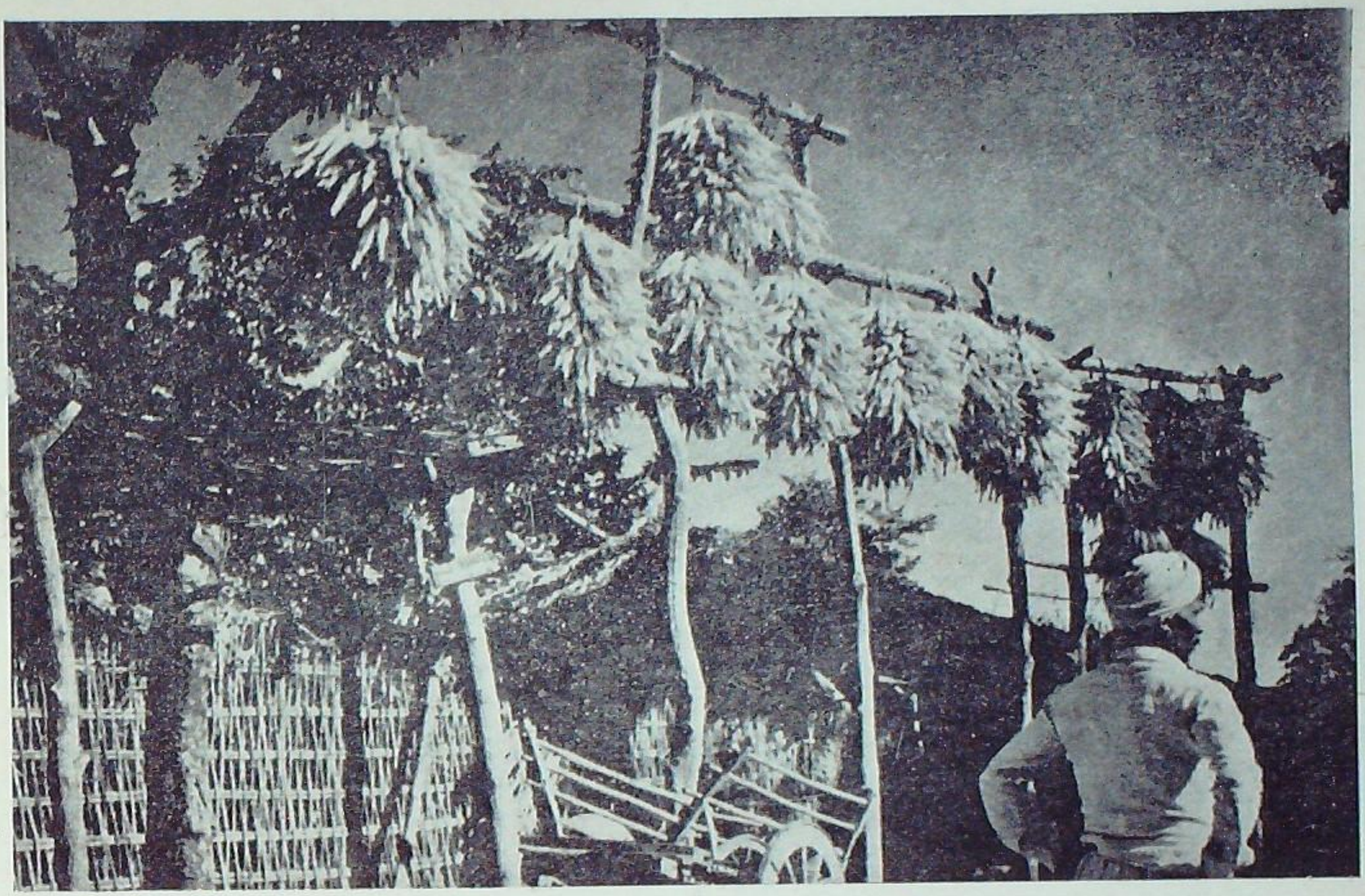
In wet nurseries, the odd grains that germinate with the first irrigation should be trampled under when puddling the seed-bed.

Many a time, sweepings from cattle sheds and threshing yards are thrown in vacant places without any composting and are applied to paddy fields. These sweepings contain odd paddy seeds as well as weed seeds. When these germinate in the nurseries and fields, it becomes a hard job to remove them.

It is a good practice to level and clean the nursery beds before the seed is sown. As far as possible the same nursery bed should be used for sowing the same variety every year. It is better to use the corners of fields and a compact block of field for the nursery. If individual channels, four links apart, are provided between nursery beds where different varieties are

A good crop always comes from good seed





Maize cobs get a sunning

sown, the chances of the seed from one bed being washed into another is checked. Also, care should be taken, while sowing, to see that the seed is not blown over into another plot.

It is safer not to use seedlings from the borders of the nursery, where more than one variety is grown, for transplanting in the field.

After the seedlings have been pulled out, it is better to plough up the nurseries twice or thrice, so that any seedlings left behind get mixed with the soil and decay.

It is not necessary for the farmer to keep a watch for off-types in the whole field or in all the fields. He should set apart a portion of his field for seed, and pay all attention to this plot to see that the crop is pure.

In sugarcane, if farmers grow a seed-crop from June to January, they will not only need a lesser quantity of seed material (1 to 1¼ tons as against the normal 2½ to 3 tons), but also will get better germination from the setts.

Where a crop is cross-pollinated, the seed plot should be in the centre of the field.

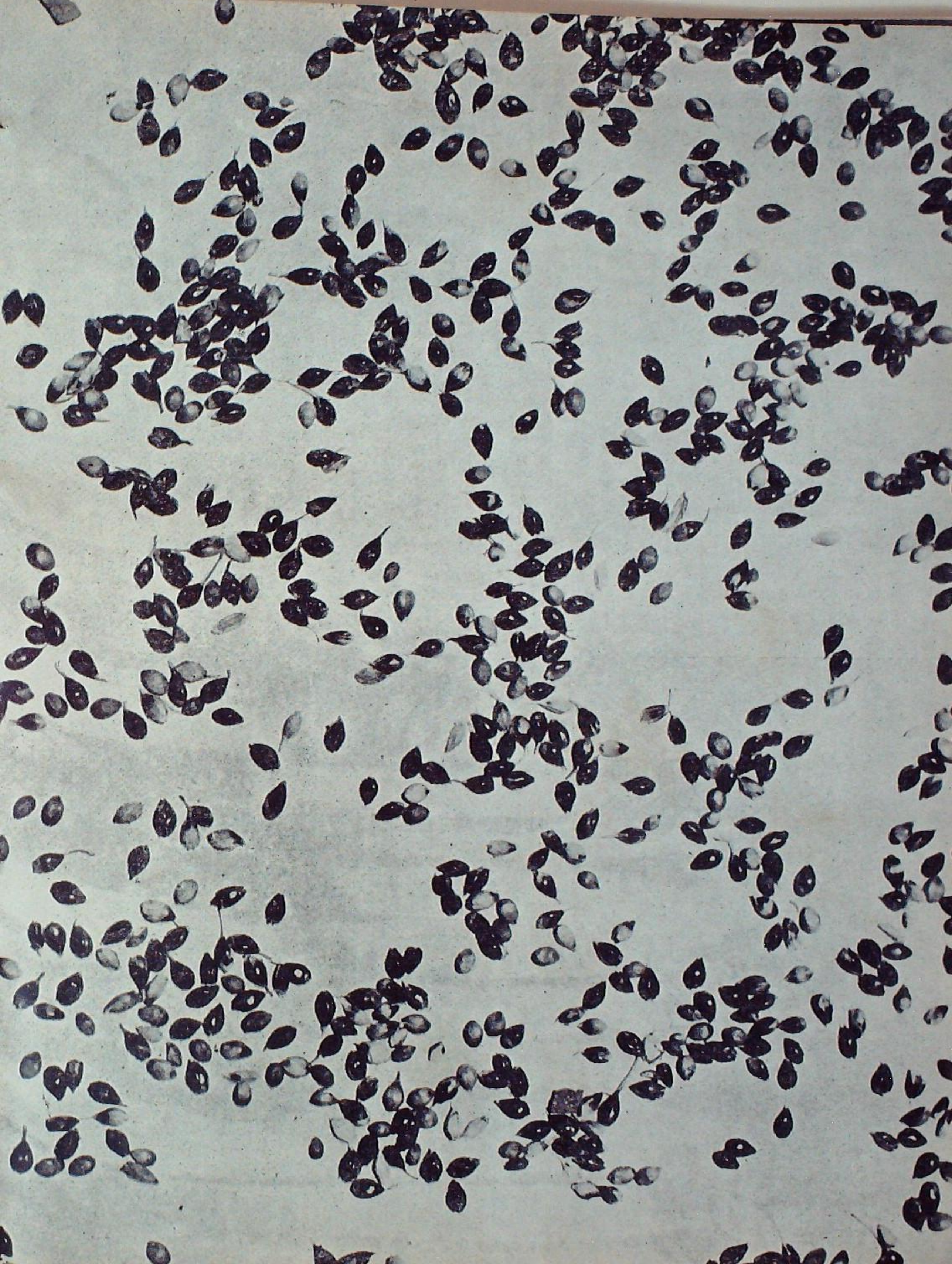
It would be ideal if the same variety is grown in a block of fields, or even in the entire village.

In *jowar*, ears meant for seed should be harvested earlier than the rest of the crop.

For cotton, care should be taken while ginning the *kapas*. It is better to gin the *kapas* meant for seed separately under the farmer's own watchful eyes.

For chillies, the farmer should go round the field and select the best pods.

All this care in getting the best seed and pure seed pays in the end, in the form of better crops and better income to the farmer.



HOW MYSORE MULTIPLIES IMPROVED SEED

By M. L. SUBBANNA
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Mysore State, Bangalore

IN Mysore State, the Department of Agriculture has been evolving a number of improved varieties of crops. When a new variety is evolved, large scale trials are conducted for at least three years at the Research Station where it is evolved, to see how it performs.

When the variety shows that it is superior to the local or other improved varieties, it is tried on farmers' fields in the different tracts of the State to find out to which tract it is most suitable.

When a variety thus shows to be a good one, it is multiplied and distributed in the area after it is approved by the Regional and the State Research Council.

Seed has to be multiplied in Government Farms in the early stages. Later, it is further multiplied in the fields of the farmers or farmers' organizations, under the supervision of the staff of the Agriculture Department.

The nucleus seed and the foundation seed produced at the Research Stations and Departmental Seed Farms, respectively, comes to the registered seed-growers. In the State, there is only one stage of multiplication in the fields of registered seed-growers. This seed is the registered seed and is distributed to farmers for sowing.

In Mysore, the plan is to produce sufficient quantities of improved seed of all important crops, and especially of paddy, *ragi*, *jowar* and wheat, necessary to cover only 25 per cent of the total area under each of these crops every year.

This is so because farmers are not needed to change the seed every year, but once every four or five years. The idea is that a fourth of the total area under the crop is covered by the improved seed each year, so that in four years the whole of the area is covered. Thereafter, the seed produced at the State Farms will go to replace the farmers' seed which might have become impure by then.

In the Second Plan, priority was given to the multiplication and distribution of seeds of improved varieties of paddy and *ragi*. These are the staple food crops of the State. Improved varieties of these crops suitable for the various regions are available. Suitable varieties of *jowar*, wheat and *bajra* are still being evolved and hence their multiplication and distribution are being taken up in the Third Plan period.

Fifty-one seed farms had been set up in the State till the end of June 1960, 48 of which are busy producing foundation seeds of improved varieties.

On the next three pages is a list of the recommended improved varieties of the important crops of the State.

Paddy	*Ragi*	*Jowar*	Wheat	Pulses
Mysore				
S. 317, S. 701, B. 194 *S. 705, S. 669, Ch. 45* *S. 661, H. 497, S. 199* *S. 749, S. 139, Baroda* *S. 718, S.R. 26* *B. B. 281,* *S. 1092, GEB. 24,* *B. 1370, Ch. 2*	*H. 22, R. 0786* *K. 1, ES. 11* *R. 0871, R. 0862* *R. 0870, Aruna,* *ES. 13*	—	—	*Thogary 3*
Coorg				
K.B. 356 *M.B. 319* *P.S. 1* *Andrewsail ?*	—	—	—	—
Hassan				
S. 317, GEB. 24 *S. 705, Ch. 45* *S. 661, Ch. 2* *S. 749, S. 199* *S. 718, Baroda* *S. 1092*	*H. 22, R. 0862* *K. 1, Aruna,* *R. 0871, ES.13* *R. 0870, R. 0786* *ES. 11*	—	—	—
Shimoga				
S. 317, Ch. 45, B.194 *S. 749, Ch. 2* *S. 718, S. 199* *S. 1092, Baroda* *S. 701, B. 281* *S.R. 26B, B. 1370*	*H. 22* *ES. 11* *Aruna*	—	—	—
South Kanara				
GEB. 24, PTB. 10 *PTB. 20* *MGL. 1, PTB. 28 Co.3* *MGL. 2, MTU. 3,* *Co. 14* *MGL. 3, MTU. 4* *Co. 25* *MGL. 4, MTU. 20, 15* *MGL. 5, MGL. 6* *PTB. 9, PTB. 4* *PTB. 16*	*Co. 1*	—	—	—
Chickmagalur				
S. 317, GEB. 24 *B. 194,* *S. 705, Ch. 45* *S. 661, Ch. 2* *S. 749, S. 199* *S. 718, Baroda* *S. 1092, B. 281* *B. 1370*	*H. 22* *Aruna*	—	—	—

Paddy	*Ragi*	*Jowar*	Wheat	Pulses
Bangalore				
S. 317, S. 669 *S. 705, S. 139* *S. 661, SR. 26. B* *S. 749, Ch. 45* *S. 718, Ch. 2* *S. 1092, Baroda* *H. 497, S. 199*	*H. 22* *K. 1* *ES. 13* *Aruna*	—	—	*Thogary-2*
Mandya				
S. 317, S. 669, *S. 661, SR. 26. B* *S. 649, GEB. 24* *Baroda* *S. 718, Ch. 45* *S. 1092, Ch. 45* *S. 701, S. 199*	*H. 22, Aruna* *K. 1, ES. 13* *R. 0871* *R.0786, R. 0870* *E.S. 11*	—	—	*Thogary-3* *Bengal gram-2*
Chitradurga				
S. 317, Baroda *S. 705* *S. 661* *S. 1092* *Ch. 45* *Ch. 2* *S. 199*	*H.22* *Aruna*	*D. 340*	—	*Thogary-3*
Tumkur				
S. 705, SR. 26. B *S. 661, Ch. 45* *S. 749, Ch. 2* *S. 718, S. 199* *S. 1092. Baroda* *H. 497*	*H. 22, ES. 13* *K. 1, R. 0786* *R. 0871* *R. 0870* *ES. 11* *Aruna*	—	—	*Thogary-3*
Kolar				
S. 705, Ch. 2 *S. 661, Ch. 45* *S. 1092, S. 199* *H. 497, Baroda* *S.R. 26. B*	*H. 22, ES. 13* *K. 1, R. 0786* *R. 0871* *R. 0871* *ES. 11* *Aruna*	—	—	—
Dharwar				
M. 161, M. 141 *M. 81, W. 1,* *M. 249, D. 6-22* *A. 67, K. 244-1* *A. 90, Y-4* *A. 200*	—	*M-35-1* *Nandyal* *White fulagar* *Yellow fulagar* ***Bilichigan*** *G.S. 560-1-1* *Yennigar-2*	*Kenphad*	*Chinamug-78* *Chaffa-gram* *Tur-F. 52* *Tur-T S. 136* *Tur-T.S. 24*

Paddy	Ragi	Jowar	Wheat	Pulses
Bijapur	—	*M-35-1* *M-47-3* *H-1* *Bilichigan*	*Kenphad*	*Tur-F. 52* *Tur-T.S. 136*
Belgaum				
M. 161, W. 1. *M. 81, D.6-2-2* *M. 249, K. 44-1* *A. 67. Y-4* *A. 200.* *M-141*	—	*M-35-1* *White-fulgar* *Bilichigan*	*Kenphad*	*Chaffa-gram* *Chinamug-781* *Tur-F. 52*
North Kanara				
J. 1061, D. 6-22 *RH. 244, K-44-a* *M. 1315. M. 247* *W.H. 1690, A. 67* *M. 161, A. 90* *M. 81, Y-4, A200* *M. 141, W.1*	—	*Yellow-fulgar*	—	*Tur. F. 52*
Raichur				
GEB. 24 (parts of Raichur *H.R. 35 Division)*		*D. 340*	*P.W. 5*	--
H.R. 19	—	*N. 35*		
Gulbarga				
H.R. 35	—	*D. 340*	*P.W. 5*	---
H.R. 19		*P J. 4. R. 7* *M. 35-1*		---
Bidar				
H.R 35	—	*D. 340* *M. 35-1*	*P.W. 5*	—
Bellary				
GEB. 24 *Ch. 45* *Ch. 2* *S. 199* *Baroda*	*K. 1* *H. 1*	*Co 49* *D. 340* *M. 47-3* *H. 1*	—	—

CROP PESTS AND DISEASES IN JUNE

AND WHAT TO DO ABOUT THEM

By D.B. REDDY
Plant Protection Specialist, Directorate of Extension
New Delhi

ONCE the diseases or pests get a chance to attack the crop, most of them try to remain there. Better check them before they spread. Here are the most important ones which may visit your field this month. For further information and details consult the local Agricultural Officer or the Gram Sevak.

Crop	*Pest/Disease*	*Control measures*
Cotton	Angular leaf spot or black arm disease	Treat seed before sowing with an organo-mercurial fungicide (1 per cent active material) at 1 : 250 parts by weight.
Jowar	Grain smut	Treat seed before sowing with fine sulphur dust at 1 : 250 parts by weight.
Paddy	Foot-rot	Treat seed before sowing with an organo-mercurial fungicide (1 per cent active material) at 1 : 400 parts by weight.
	Helminthosporium Blast	Spray 3 : 3 : 50 Bordeaux mixture or a copper fungicide.
	Stem borer	Spray 0.02 per cent Endrin or 'Parathion'.
Ragi	Foot-rot Leaf blight	Treat seed before sowing with an organo-mercurial fungicide (1 per cent active material) at 1 : 400 parts by weight.
Sugarcane	Stem-borer	Pull out the dead-hearts and destroy them by burning. Spray 0.1 per cent Endrin or any other insecticide.
Wheat	Loose smut	Treat seed by solar-heat method or give hot-water treatment where summer temperatures are not high, before seed is stored.
	Earcockle	Remove galls from the seed by the floatation method before seed is stored.

Some of the pesticides like Endrin and organo-mercurial fungicides are very poisonous and should be handled and used with great care.

WEED-FREE WHEAT

FARMERS have to fight insect pests, diseases, floods and droughts to save their crops and get as much returns as possible from their land. In addition to these, they also have to fight weeds.

Weeds rob the crop of water, light and food, harbour insect pests and crop diseases, make the farmers spend more on cultivation and bring down the value of the crop for grain, seed or fodder.

In the case of cereals, loss due to weeds may vary from 5 to 40 per cent, depending upon the type of weed, its spread in the field and the fertility of the soil. Even if the value of the crop loss is taken at ten per cent, the loss in the country is estimated at Rs. 13.3 crores every year. Apart from this, grain mixed with weed seeds always fetches a lower price in the market.

Weeds get into the wheat fields in many ways, getting sown with wheat seed being the most important one. Millions of seeds of weeds like *piazi*, *bathu*, *pohli*, *leli* or *hirankhuri*, *takla*, *rewari*, *pitpapra* and *krishannil* get sown every year with wheat seed, to multiply further at the cost of the crop.

Many ways are suggested for getting rid of weeds, but the most effective and the cheapest method would be to use weed-free seed.

In separating out weed seed from wheat, a number of machines can be used. One such, developed some years back at Lyallpur, at a cost of about Rs. 25 should be of interest to farmers.

This machine has a six-foot long wire-gauze cylinder of two feet diameter, and is open at both ends. The gauze cylinder is supported on a framework of iron-bars and iron-rings. An eight-foot iron rod passes

By RAM DHAN SINGH
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axlewise through the centre. A handle for revolving the cylinder, a funnel-shaped hopper for feeding it and two stands for support, one at each end, complete the machine.

The machine has eight meshes in a linear inch either way, suitable for handling seed of common improved wheat varieties. When the cylinder is revolved, all weed seeds drop down along with the shrivelled wheat grain. Even earcockle galls drop down. Only the gall-free plump wheat seeds are collected at the tail-end of the machine. The machine can grade the seed as well. An added benefit is that the shrivelled grain which may carry diseases is also got rid of.

Such a machine will be useful to a group of small-scale wheat seed-dealers or growers, as it can clean 200 maunds of wheat grain per day.

If, in addition to the machine, a blower fan is also used, the chaff and dirt can also be got rid of. But the most important part of the machine is the wire-gauze with eight meshes per linear inch either way. Even an ordinary sieve with the wire-gauze of the same number of meshes per inch can be used with good results.

What about the weed seeds that drop in the field before, during and after wheat harvest ? Using the machine for separating out the weed seed from wheat seed year after year will get rid of this problem too. However, to make the job quicker, farmers have to take to *daab* before sowing wheat. *Daab* is nothing but ploughing the field once or twice, watering and then planking it and leaving it for a week. During this week, all the winter season weeds will germinate, when they can be destroyed by cultivating the field again before sowing.

STURDIER RICE PLANTS

WHERE a transplanted crop of rice is grown, farmers generally tend to use a high seed-rate for the nursery.

Experiments have shown that this practice is wasteful. A seed-rate of 10 to 15 pounds per acre has been found to be sufficient. This quantity should be sown in a seed-bed area of five to seven cents.

Thin sowing encourages seedlings to grow sturdy and healthy. The practice not only increases yield, but also effects a good saving in seed.

IT'S EASY TO GET QUALITY SEED IN SUGARCANE

By M.B. TIPPANNAVAR
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Sugarcane Research Station
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IN the Visveswariah Canal Tract of the Mandya district of Mysore State, sugarcane is an important cash crop. But the average yield is only 25 tons per acre. One important reason for the low yield is the poor germination—only 35 to 40 per cent of the seed material. This again is due to the poor-quality seed material used.

In a plantation crop like sugarcane, quality seed is as important as it is in the case of other crops, if good yields are to be obtained.

In many sugarcane-growing countries of the world, they give an extra dose of manure to the plots of sugarcane which are reserved for sugarcane seed material. Experience in Padegaon (Maharashtra) also shows that a well-manured cane gives quality seed material, and thus a good crop.

The experiments at the Sugarcane Research Station, Mandya, also confirm this fact. At the Station, seed material was raised on two plots. One plot received 300 pounds of nitrogen, 120 pounds of phosphoric acid and 100 pounds of potassium per acre over a basal dose of ten cartloads of compost. The other plot received the usual dose applied by farmers, i. e , 150 pounds of nitrogen and 50 pounds of phosphoric acid over the basal dose of ten cartloads of compost.

The nitrogen was given in four doses, in the proportion of 10 per cent, 20 per cent,

Such a crop can be yours too if you plant quality seed

30 per cent and 40 per cent, applied at planting and 6, 10 and 14 weeks after planting, respectively.

The phosphoric acid and potassium were given at planting.

The seed material was harvested after nine months from each plot and planted separately to see how each one behaved.

The seed material from the plots which received better manuring not only germinated a week earlier, but also showed an increase in germination by 30 per cent.

When the seedlings from both the plots were pulled out after six weeks and examined, it was seen that the better-fertilized seeds had produced vigorous seedlings.

The poor-quality seed gave out only thin shoots. The stand of the crop that came from the better quality seed gave a better crop and a better yield.

It is wise to reserve a small area of your field for seed, and manure it sufficiently, so that you can have a good quality seed with which to get a better crop yield.

By H.C. MALIK
Deputy Director of Agriculture (Development)
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FODDER CROPS ARE POOR SEED-SETTERS

IN the Punjab, farmers grow about a dozen fodder crops, half of them during the *kharif*, and the other half in the *rabi*.

The Fodder Research Section of the State Department of Agriculture has evolved a number of improved varieties of these fodder crops, and many farmers are growing these better varieties in their fields.

But, however good these improved varieties are, they cannot be fully popular with farmers if they are poor in setting seed. Farmers have to use a high seed-rate per acre if they have to get a high fodder yield. If the seed-setting is poor in these crops farmers cannot get all the seed they want.

Of the *kharif* fodders, *jowar* is the most popular. It is grown irrigated as well as under dry farming conditions. It is to be had as green fodder in the main season, and as *kadbi* in the winter. The farmer has three good improved varieties—*No. 20*, *No. 29* and *No. 263* to select from.

No. 20 is a thin-stalked non-sweet variety, that can grow under irrigation as well as in comparatively drier conditions. Its dried stalks keep well for a long time. It sets very good seed even when conditions are bad.

No. 29 has medium-thick stalk and is a non-sweet variety, more suited to high rainfall conditions. The head is compact and the grain white, and is very much liked by the cattle. It is able to escape the attack of the red leaf spot disease.

No. 263 is a sweet variety with medium-thick stalk, compact ear and creamy grain. It, however, gets borer attack and red leaf spot disease which lower the fodder quality.

Seed-setting in *No. 29* and *No. 263* is not bad, but is adversely affected if there is a shower of rain at the blooming period. The farmer can sow the crop late to overcome this difficulty, but then he will have to face loss of seed due to birds and he will also not be able to grow gram or other legumes during

winter as the land will then be still under the fodder.

To some extent, he can get over this difficulty by growing *No. 20*. But this is possible only in some areas of the State.

Poor seed-setting in other sorghums like Sudan grass is the reason for their not yet getting popular with farmers.

If Sudan is allowed to sprout in the following spring, some more seed can be had from it. But then the land will be kept occupied, and the small quantity of seed obtained will make the seed production costly also. While the main crop gives three to five maunds of seed, the ratoon will produce one and a half to three maunds per acre.

Sweet varieties of Sudan are now being developed, but till such varieties can give good seed yield they cannot be popular with farmers.

Seed-setting in other *kharif* fodders like *guara* and *moth* is not a problem. Because of this, improved varieties of these crops have spread well. But in cowpeas, seed-setting is still a problem. Only a few improved varieties like *No. 1* are better seed-setters than others. The cowpea yields but 8 to 10 maunds of seed as against 12 to 15 maunds per acre from *guara*.

Of the *rabi* fodders—oats, berseem, *senji*, *metha*, turnip and rape—seed-setting in *senji*, *metha*, oats and rape is quite good.

Half a dozen improved varieties of oats set good seed, giving 18 to 25 maunds of seed to an acre. Of course, the seed yield goes down if the crop shows an excess of vegetative growth. For seed, oats have to be sown in a medium fertile soil by mid-November, and given only a few irrigations.

Among oats, *Brunker 10* and *Western 11* give very high seed yields. Late ripening varieties like *Algerian* and *Fo. S. 1/29*, though they set good seed, give a low yield because the severe hot season sets in at the seed-ripening time. Rape sometimes is affected by frost, and gives but a low seed yield.

Senji gives about 10 to 12 maunds, *metha* 8 to 10 maunds and rape 18 to 20 maunds of seed per acre.

Berseem is one of the most important *rabi* fodders, and very popular with farmers, who sometimes buy its seed even at high prices.

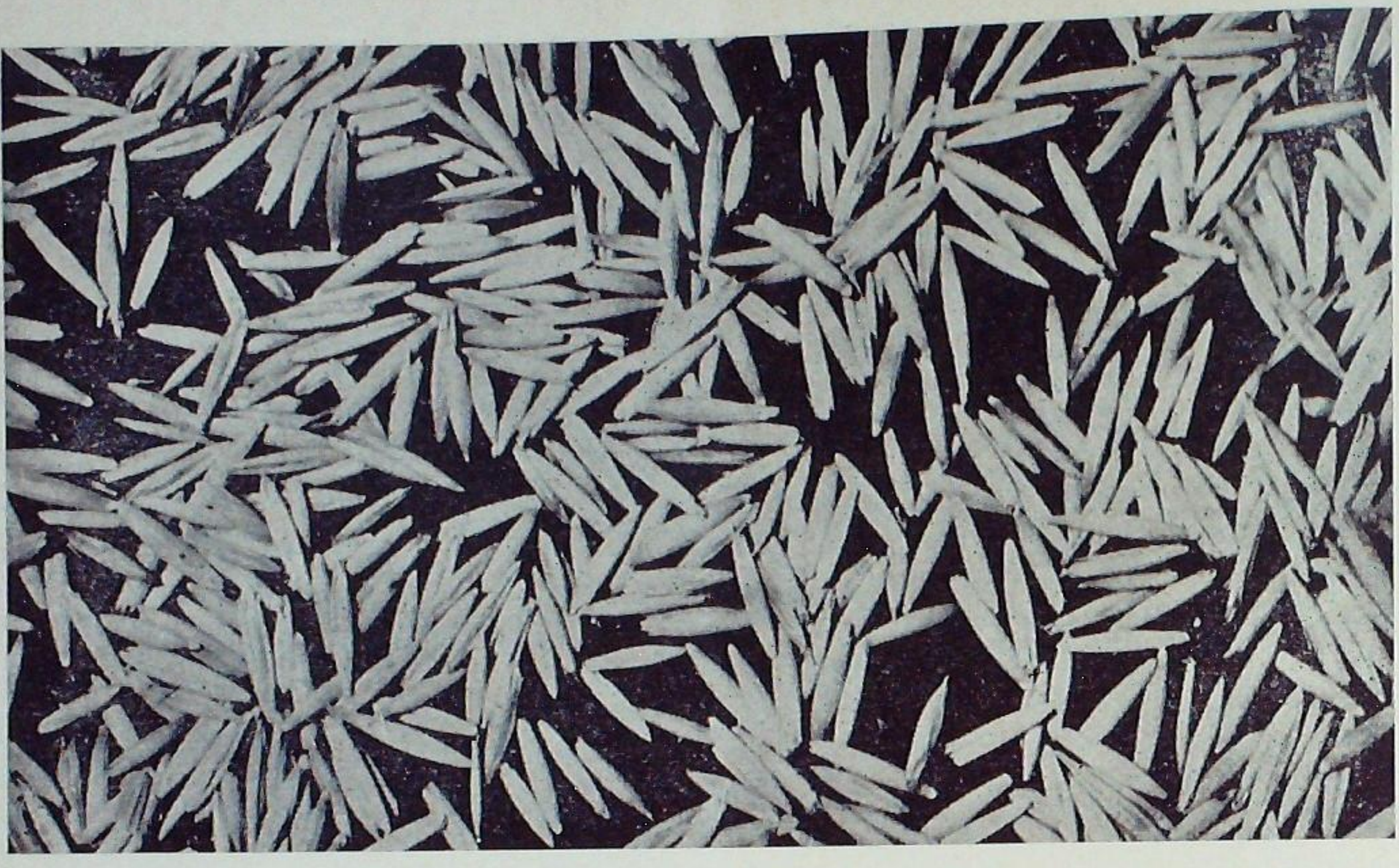
In the earlier years of introduction, berseem was shy in setting seed, and most of the seed had to be imported. Now many varieties of berseem, especially *Mescavi*, have become acclimatized to our conditions, and generally set seed well.

In humid areas, the crop is left to seed in March after three or four cuttings have been taken. But in eastern Punjab, where the season warms up early, it should be left to seed by the end of February or early March. Setting of seed will be very good if the season does not warm up very much in March-April. Bees are active in a berseem crop when the season is mild, and enhance seed yield. Normally, in a good season, berseem gives 10 to 12 maunds of seed per acre, but when the weather warms up early, the yield dwindles down to one or two maunds only. Where the soil lacks phosphate, seed yield increases if two to three maunds of phosphate are applied per acre.

Lucerne is of great importance in areas with a low rainfall. It gives a good growth in winter and spring, but is badly affected by the hot and humid conditions during the monsoon. The severe heat of May-June brings down the fodder yield to a great extent.

When the crop is raised for seed, it is better to sow it in lines two feet apart, so that intercultures can be given when the crop is growing up.

The setting of seed in lucerne depends greatly on the season. If the season is tolerably mild during March-April and is not too cold in February, seed setting is good, and you get five to six maunds of seed to an acre. But if the season warms up early, as happens when the rains fail, seed-setting is poor. It is due to low yields that lucerne seed sells



Brunker 10 — *the oats famous for its high seed yields*

at a high price of four to five rupees a seer.

Seed-setting is thus very important in fodder crops. It is the poor setting of seed in these crops that stands in the way of popularizing the new improved varieties evolved by the Department.

MAKING FORAGE GRASSES YIELD MORE

How yields of pasture grasses can be increased has been shown at the Hill Grasses Research Station at Palampur in the Kangra Valley of the Punjab.

At the Station, the yield of *sarwala* (*Heteropogon contortus*), a common hill grass, was found to double with the application of nitrogen and phosphate.

When a fertilizer mixture containing 17 pounds nitrogen and 3 pounds phosphoric acid and another containing 15 pounds nitrogen and 5 pounds phosphoric acid were applied, the yields went up to 185 maunds and 192 maunds per acre, respectively, as against the normal yield of about 97 maunds of the grass per acre.

WHAT MAKES GOOD SEED

By B.G. BHAPKAR and R. D'CRUZ
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OF course you know that a good seed assures a good yield. Also, that a good seed is the easiest and cheapest way of increasing farm output.

But two seeds are not alike. Seeds vary so much in their characters that they have given rise to many varieties. Hence, when you talk of growing an important variety on your farm, you should select the one that will give you the best yield and also will show other characters which will be profitable for you to grow.

This leads us to the question of what makes a seed good. A good seed must have adaptability, yielding ability, quality, purity and ability to resist pests and diseases.

ADAPTABILITY : The variety you select for growing should be suitable for the soil and climatic conditions on your farm.

YIELDING ABILITY : When you find that there are two or more varieties suitable for growing on your farm, select the one that gives the best yield. When there are different varieties, each one giving the best yield in a particular region, it is better you seek the advice from the nearest Government Seed Farm as to which one you should grow.

QUALITY : The quality as to the crop you grow is very important; sometimes more important than the quantity it gives you. Better grow a rice with white and fine grain, *jowar* with bold, pearly grains having sweet taste, wheat with a high milling quality, gram

and other pulses with a high protein content, groundnut and safflower with a high oil content, sugarcane with a high sugar recovery and cotton with high ginning quality and long staple length. Perhaps, you have your own ideas about the quality you want to see in your crop, such as non-lodging habit in your rice crop or the non-grain-shedding quality or may be you want a variety which responds well to high doses of fertilizers.

PURITY : A pure seed is the one that you should try to get. It ensures a better yield.

RESISTANCE TO PESTS AND DISEASES : Many new varieties which offer resistance to pests and diseases are now available, and you should go in for such a variety, if pests and diseases also are problems that you face.

Apart from all these, a good seed should also have other properties.

HIGH GERMINATION : Seeds which do not germinate or give but poor germination produce weak seedlings. These are useless. A good seed should have 90 per cent germination.

PROPER SIZE : It is not desirable to give your crop a poor start. Shrunken and shrivelled seed do not give strong or healthy seedlings. Hence, select only well-developed seed.

UNIFORMITY : Since a smaller seed will produce a weaker seedling and a bolder one stronger, see that the seed is uniformly bold.

FREEDOM FROM DISEASES : Seeds carry several diseases. If you sow disease-carrying seed, the crop will be diseased too. Hence, avoid such seed.

FREEDOM FROM WEED SEEDS : If yours is a good seed, it should be free of weed seeds. Similarly, there should be no seed of other varieties or other crops mixed with it. A seed mixture never pays.

Always remember that it is not the number of seeds planted, but the number of healthy seedlings that come up in the field that counts.

TESTING SEEDS

It is better to test the seeds before they are sown. Take samples in such a way that they represent all the seed. You have a number of instruments for drawing samples of seed from bags or bins. Triers or stickers are most common ones. The double-tubed sleeve-type triers are very good for taking out samples.

When the seed is free-flowing type, use the probe trier. For non-free-flowing seed as grass seed or unclean seed, take samples by thrusting your hand in the seed bag.

If the seed lot is not uniform, don't make one composite sample. Test separately from each bag.

To get a composite sample from bags, sample each bag when all the stock is in five bags or less. If more, take out sample from every fifth bag.

When seed is in bulk, take out a sample by inserting a long trier or by thrusting the hand in at least seven uniformly distributed points of the heap. For cereals and beans, two pounds will be enough.

If you have taken a composite sample, it should be tested further. This testing is done to see the quantity of pure seed of the desired type, the seeds of crops of the undesired type, weed seed and inert matter in the sample.

When you have separated out the pure seed of the desired type from the sample, weigh and find out the percentage of such seed. This gives you the purity percentage. For testing the purity, various instruments are used.

Germination should also be tested. For this, you must take out at least 400 seeds, so that there are four lots of 100 seeds each. Count the germination in each lot and take the average. But if you find a difference of ten per cent between any two

Healthy plants come from healthy seed

lots, then you will have to retest germination with a fresh sample.

The count you take of the germinated seed gives you the germination percentage. From the germination and purity percentages, you can calculate the utility percentage. Utility percentage is equal to

$$\frac{\textit{purity percentage} \times \textit{germination percentage}}{100}$$

In India, so far the State Departments of Agriculture produce and distribute seeds of improved varieties. In many foreign countries, there are private agencies which take up the multiplication and distribution of improved seed. These are organized on very sound lines and are a great help to the farmer in getting the seed in the quantities he wants. We too need such a service in this country.

MYSORE'S THREE NEW

RAGIS

By C.H. LAKSHMANAIAH
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THE Mysore Department of Agriculture is distributing to farmers three new *ragi* varieties good for growing in wetland areas. They are named *Aruna*, *Udaya* and *Purna*.

All the three are early varieties (take 105 days from seed to seed), and actually occupy the land for 75 to 80 days after the nursery stage.

In the State, *ragi* is one of the most important food crops, being grown over two million acres. The production of seven and a half lakh tons of grain a year, however, falls short of the great demand for this foodgrain. *Ragi*-growing depends so much upon rains that a bad season results in a poor crop.

After the new irrigation projects were completed in the State, farmers began growing *ragi* under irrigation wherever they could grow the crop. This naturally resulted in a demand for better irrigated *ragi* varieties. The three new varieties are an answer to this demand.

All the three varieties can be cultivated any time during the year excepting during October-November and even when the irrigation available is not very much. This enables farmers to plant as well as harvest the *ragi* crop early, so that they have enough time for the next crop. All the three mature uniformly and, as such, farmers can pick all the ears in one picking. When compared to other short-

duration *ragi* types, these are high yielders.

IN CANAL AREAS

In the canal areas, these varieties can be grown in summer with a minimum use of irrigation water. Because they can be planted early and harvested early, it is possible to grow a green manure crop before the main crop season. This means the growing of two additional crops—a foodgrain crop and a green manure crop—without interfering with the usual cropping system and with the available irrigation facilities.

Even during the monsoon, these varieties can be grown in the tail-end of the canal areas where irrigation facilities are not very good, and the paddy crop does not give satisfactory results.

UNDER LIFT AND TANK IRRIGATION

The short-duration *ragi* varieties can be grown with profit in rotation with other cash crops like paddy, onion and chillies, where irrigation is by the lift system.

Most of the tanks used for irrigation get their water supply from the rains and have a limited storing capacity. Often water is received from late showers and hence left unused. The *ragi* varieties, because they are not bound by season, can be raised with this water in such a situation.

IN DRY LANDS

The *ragi* varieties grown at present under dry conditions mature late, and also they are highly season-bound. When the rains are late, these varieties cannot be grown and hence the land is many times left fallow or put under legumes. But the new varieties can be very easily grown within the same rainy period.

Mysore farmers have now three *ragi* varieties which they can easily grow and thus help meet the shortage of this popular foodgrain in the State.

FOR MANGO GROWERS

Mango growers usually collect stones (seeds) of mixed varieties of mango from the streets and wayside places during the harvest season, and sow them in pots for raising stock plants for grafting later on.

This is not a good practice. To get healthy, quick-growing stocks which will grow to the right size for grafting in the shortest time possible, fruits of a selected country mango tree known for producing vigorous seedlings should be collected and their seeds extracted for growing stocks.

If this is not possible, good, plump, healthy, full stones should be sorted out from the mixed lot collected and sown first in a small bed. After about two months, the most vigorously growing seedlings among them should be planted in pots.

GREEN MANURE PHOTOGRAPHS

Five photographs on green manures published in the March, 1961, issue of EXTENSION were kindly supplied by Shri S. N. Malik, Agricultural Research Officer, Sambalpur, Orissa.

THE BETTER RICE VARIETIES OF ANDHRA PRADESH

By N. H. V. KRISHNA MURTHY
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Rajendranagar, Andhra Pradesh

ANDHRA Pradesh is a rice state. With 7.2 million acres under the crop and 3.6 million tons of paddy a year, it accounts for a tenth of the area and an eighth of the total paddy production of the country.

The average acre yield of 1,167 pounds in the State is not a low figure when compared to the acre-yields in other states. To take the yield still higher, the work of evolving new varieties of rice to suit the various soil and climatic conditions of the State has been going on for the last many years.

In the last ten years or so, there has been an increase in the per-acre yield. This is partly due to the opening of many major and minor irrigation projects as much as to the farmers taking up improved practices and also due to the higher price available for rice.

Fifty years ago, the work of improving the rice in the State started. Today it is in progress at 15 research stations, of which the stations at Samalkota, Maruteru, Anakapalli, Rajendranagar and Buchireddipalem are the important ones.

So far 81 improved rice varieties comprising superfine, fine, medium and coarse grain types with duration ranging from 95 to 220 days have been released to farmers.

The conditions under which the rice is grown and the practices followed for growing the crop differ in different parts of the State.

Sixty per cent of the total rice area of the State lies in the deltaic districts of the East Coast with their rich alluvium soil and an assured water supply. In the Telangana lies 25 per cent of the rice area where the crop is grown under tanks and wells. The rest of the rice is in the Raylaseema tract.

In the low-lying pockets spread over about 2 lakh acres in the Collair tract, rice is grown in two to four feet deep water and along the 600 and odd mile long coastal belt, rice-growing faces saline conditions. About 2 lakh acres suffer from salinity and alkalinity.

The most papular variety in the delta areas is *Akkullu* (*MTU 1* and *SL013*), which puts on such good vegetative growth that it lodges even with a small quantity of fertilizers. The yields thus go down. Most other popular varieties do not have stiff straws and also do not respond well to heavy dose of fertilizers.

In certain years, blast among the diseases causes up to 90 per cent loss of crop.

Research work has been directed towards solving these problems with good success.

DEEP WATER PADDY

In 1950, a rice research station was opened at Pulla to evolve varieties resisting flood and deep water conditions. The three strains *PLA2*, *PLA3* and *PLA4* were evolved at the Station and have become popular with farmers.

PLA2 yields over 2,000 pounds of paddy per acre and can withstand five feet of water as well as water stagnation for four months. Where the flood is not very severe and the soils are loamy, *PLA3* is a suitable strain for growing. *PLA4* has been doing well in places where floods come off and on.

SALINE CONDITIONS

In the saline areas of the State a variety from Orissa, *SR26B*, used to be grown. Where the salinity was not very high, *MTU1* and *SL013* (medium late) and *MTU9* (early) were also being grown.

SR26B was, however, not popular because of its poor milling quality. Now, two new cultures, *10022* and *10034*, which yield higher and have better grain quality and a 170-day duration are available for growing in these areas. For the second crop season, culture *1327* has been found suitable.

THE LODGING PROBLEM

Work is going on at Maruteru Research Station to evolve varieties which do not lodge, and respond well to fertilizer application.

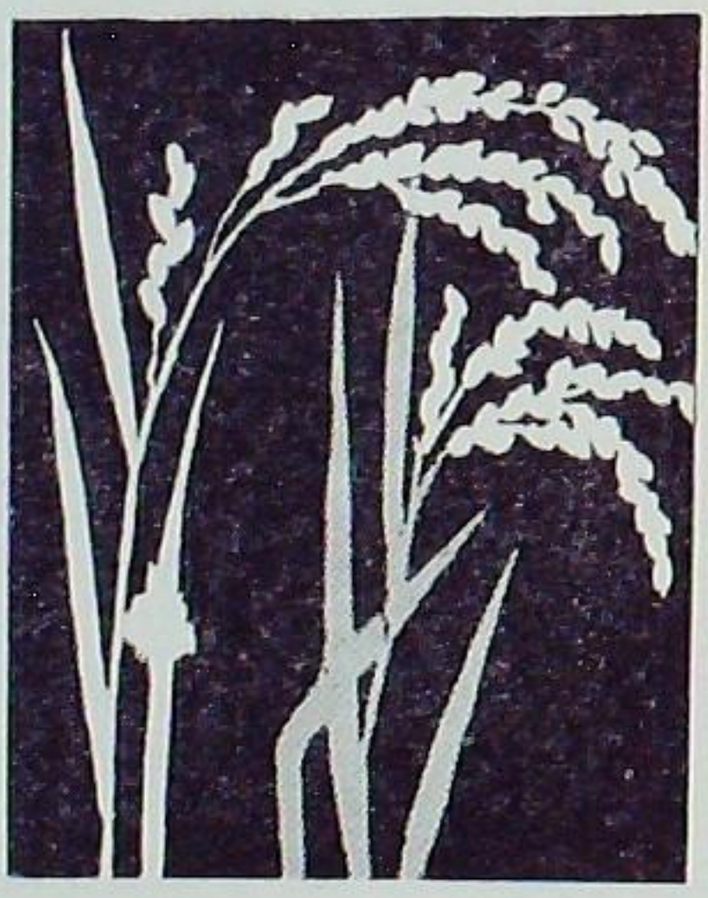
Already, two cultures (*1781* and *3282*) have shown very good results in farmers' fields.

RESISTANCE TO BLAST

Four new cultures, *6517*, *6522*, *5352* and *5392* evolved by research are showing 90 to 98 per cent resistance to blast disease. They are now being tried in Nellore and Chitoor districts.

In the meantime, research work is going on to find newer and better varieties to enable farmers harvest a better rice crop.

New RICE SEED for Madhya Pradesh farmers



By S.N. DUBEY
Rice Research Officer,
Madhya Pradesh

ONE single seed improvement work of the Madhya Pradesh Department of Agriculture is saving the farmers of the State from an annual loss of about three crores of rupees.

Formerly, rice farmers used to face the serious problem of wild rice. This weed resembles the green cultivated rice plant during its growth period, and hence is difficult to weed out. In some fields as much as 30 per cent of the crop used to be this wild rice. It is difficult to get rid of it, as it sheds

its grain even before it is ripe.

This caused heavy losses to farmers.

To solve the problem, the Department evolved a strain which had purple leaves. Farmers growing this variety could easily spot out the green plants of the wild rice, and thus remove them before they could produce seed.

In Madhya Pradesh, rice research has been going on since 1903. In fact, the Rice Research Station, Raipur, opened in that year, is one of the oldest research stations in the country. In recent years, rice research has been intensified to evolve new high-yielding varieties to benefit farmers.

Rice, the most important food crop of the State, occupies 9.7 million acres, the annual production of clean rice being 3 million tons. Though rice is grown all over the State under various soil and climatic conditions the eastern region of the State is the foremost rice-producing tract. The Balaghat district is famous for its fine, scented varieties.

The bulk of the crop is sown broadcast. In the eastern region, when the seedlings are four to five weeks old, farmers cross-plough the field in standing water with a *desi* plough to thin the seedlings (they call the operation *biasi*). Where timely irrigation water is available, they transplant the crop.

In the early days, research was mainly directed towards a study of the effect of cultivation and manuring on the yield of the crop, though a number of rice strains were also evolved and distributed to farmers.

In 1932, research was intensified. Two rice research sub-stations were opened at Waraseoni and Adhartal. The more important items of work taken up were the breeding of high-yielding early, medium and late-ripening varieties of coarse, medium and fine rices, and varieties useful in getting rid of wild rice.

Research yielded nine new varieties among medium and coarse rices and five among the fine, scented rices. The new strain *R 3 Sultugurmatia* (early-ripening) gave an average increase of 23 per cent over the older strain *E. B. 17*.

Among the medium-ripening varieties, *Cross110* proved to be the best yielder. The late-ripening strain *Burma Cross 2* gave the highest yield among all strains, and soon became popular in the irrigated areas. It does not lodge, nor does it shed its grain.

The nucleus seed of the improved varieties is maintained and multiplied by the State Research Officer. This seed is supplied to the seed multiplication farms and 'A' class registered seed-growers, who keep the seed pure and sell a part of the grain produced to the Government. These growers get a premium of ten per cent over the market rate for the seed. The seed is passed on to 'B' class registered seed-growers, and the seed produced by them is distributed to farmers. The Government gives a subsidy of 15.58 per cent at every stage of the distribution.

The improved varieties are getting popular with farmers, and efforts are being made to cover as much of the rice area as possible with these better rices.

On the next page is given a list of improved medium and coarse, fine, scented and purple-leaved strains of rice recommended for the State.

Strain	*Duration*	*Average yield per acre (without manuring)* *maunds*	*seers*
MEDIUM AND COARSE			
Laloo 14	84	12	13
Safeddhan 3	112	14	26
R-2 (Nungi)	123	15	35
R-3 (Sultugurmatia)	130	19	36
R-4 (Surmatia)	145	18	12
Cross 116 (Bhondu x Parewa)	148	24	11
Cross 19 (Budhiabako x Parewa)	154	21	19
Cross 4 (Budhiabako x Luchai)	155	22	33
R. 7 (Ajan)	155	22	33
Cross Burma 1 (Budhiabako x Burma)	161	21	05
R-8 (Luchai)	163	20	20
R-8 (A) (Benisar)	166	22	03
Cross 18 (Luchai x Gurmatia)	167	28	18
Cross Burma 2 (Luchai x Gurmatia x Burma)	167	31	36
FINE, SCENTED STRAINS			
R-10 (Chhatri)	145	15	10
R-11 (Dubraj)	147	16	34
R-12 (Banspatri)	150	18	12
R-14 (Badshahbhog)	162	17	03
R-15 (Chinoor)	169	19	06
PURPLE-LEAVED STRAINS FOR ERADICATION OF WILD RICE			
Cross 51 (Nungi x Nagkesar x Sultugurmatia)	147	20	28
Cross 34 (Gurmatia x Nagkesar x Ajan)	153	20	06
Cross 5/18 (Luchai x Nagkesar x Luchai)	167	19	22
Cross 11/2 (Cross 5/18 x Burma 18)	167	23	07

Inga dulcis *is a good hedge plant in fruit orchards*

A legume being ploughed in in a phalsa *orchard*

What to do and how to do it in

YOUR ORCHARD IN JUNE

By **DALJIT SINGH**
Systematic Pomologist
Indian Council of Agricultural Research
New Delhi

HIMALAYAN TEMPERATE REGION

States : Parts of Assam, Kumaon hills (U.P.), Himachal Pradesh, Punjab hills, Kulu valley and Kashmir valley.

You will start budding of apples and continue budding of peach, pear, cherry, plum and apricot. You will also be picking fruits of mid-season varieties of apricots.

You should also :

Continue to control hairy caterpillar in all hill fruit trees by spraying with lead-arsenate-lime mixture and dusting with sodium fluosilicate ashes (1 : 8).

Do hoeing and forking of the soil in strawberry plantations.

NORTHERN DRY REGION

States : Plains of the Punjab, the western districts of U.P., western Madhya Pradesh and Rajasthan.

You will continue irrigating fruit orchards

every fourth or fifth day.

You should also :

Plough the orchards and grow some leguminous crops like *urd*, *mung* or *senai* to prevent soil erosion and to increase soil fertility.

Sow seeds of mangoes for raising stock seedlings.

EASTERN WET REGION

States : Southern parts of Assam, West Bengal, Bihar, Orissa, eastern Madhya Pradesh, eastern Uttar Pradesh and north-east Andhra Pradesh.

You will be completing the planting of banana suckers by the middle of this month and starting harvesting of bananas, mid-season and late varieties of mangoes and litchies. You will also continue sowing papaya seeds.

You should also :

Dig pits for fresh plantations of fruit trees.

Apply manure to the fruit orchards before rains.

Sow jackfruit seeds in seed-beds for raising plants.

Plough and bury leguminous crops in the orchards.

SOUTHERN REGION

States : Southern districts of Madhya Pradesh, western Andhra Pradesh and Madras, eastern parts of Mysore, Maharashtra State and Madhya Pradesh.

You will be planting banana suckers, *phalsa*, guava and citrus.

You should also :

Raise wind-breaks of *Casuarina* or seedling mangoes for protecting fruit orchards.

Raise a hedge of *Sesbania aegyptiaca* all around the banana plantation.

Sow green manure crops like *moong* or sannhemp.

Plant cuttings of pomegranates.

Sow fresh mango stones and *jambheri* seeds for raising stock seedlings to be used later for budding of choice varieties.

Train all new branches in vines properly and incutting of tendrils.

Dust orchards with five per cent BHC.

Use prophylactic sprays against insect pests and diseases.

COASTAL REGION

States : Strips bordering the Eastern and Western Ghats, parts of Mysore, Madras and Kerala.

You will complete harvesting of pineapples and mangosteens, and continue harvesting jackfruits and start fresh planting of mangosteens and breadfruits.

You should also attend to :

Cashewnut

Sowing of cashewnuts with the first monsoon showers.

Layering of cashewnuts during rains.

Breadfruit

Propagating breadfruit by rooted cuttings or by air-layering of root suckers.

Manuring young plants with cattle manure or compost, and forking the manure into the soil.

Hand-polination of female inflorescences emerging this month to increase the fruit-size and weight.

Mangosteen

Giving a second interculture to the trees.

Sowing cover crops in adult plantations.

Jackfruit

Sowing seeds in beds or in pots when the rains commence.

Transplanting seedlings in their permanent quarters in the field.

Using year-old seedlings as root-stocks for grafting.

Pineapple

Planting pineapple suckers.

FOR CASHEW GROWERS

CASHEWNUT trees having mostly the intensive type of branching are found to be good yielders, and should be used for preparing air-layers or selecting nuts for planting.

Trees, whose tender leaves give out a turpentine smell on crushing, give a better yield than those which give out the mango smell. Such trees should be selected for collecting seed nuts.

If layers are preferred, these should be prepared from high-yielding trees producing nuts of the desired quality.

Raising seedlings from nuts and planting them as stumps after six months is also a good nursery practice.

Other useful tips to cashew growers are :

Medium-sized nuts which do not rattle on shaking, from high-yielding trees are the best for planting.

The seed should be sown an inch deep in the same position in which it was held on the tree.

Nuts can also be placed on their edge in planting.

By M. PUTTARUDRIAH and D. SESHAGIRI RAO
Division of Entomology, Department of Agriculture
Mysore State, Bangalore

SEED as much as seed material like bulbs, tubers, setts and cuttings are all damaged by insects both before and after they are sown or planted.

Even while the seed is immature or unripe, and on the plants in the field, beetles and caterpillars start doing damage. Pulse beetles, seed-infesting weevils, cotton bollworms, the potato store moth, pod-borers and the castor pod-borer are some common examples of such insects damaging the seed. Storage pests like the rice weevil, lesser grain-borer (*Rhizopertha*), *khapra* beetle, pulse beetles, paddy moth and rice moth attack the seed in store.

Pests do not spare seeds and seed materials even when they have been sown or planted. Insects such as termites, ants, wire worms, ground grubs, maggots, cutworms and other soil insects attack and damage them.

The seed and seed materials sown remain in the soil for some time before germination. During this interval, they can be damaged by bacteria and fungi, protozoa, worms, insects and birds. This results in a lower germination of the seed and seed materials and a poor stand of the crop, leading to a smaller yield. The seed in the soil, therefore, has to be protected from insect damage by pretreating the seed and/or the soil, and treating the soil after sowing or planting.

PRE-TREATMENT OF SEED

Pre-treatment of seed or planting material may be physical, such as drying and steeping it in water, or mechanical as in separating the infested or damaged seeds by sieving or screening, or steeping in salt water, or chemical, where the seed is treated with insecticides, fungicides or other seed-dressing chemicals.

The chemical employed for the purpose may be a fine dust which provides a thin and uniform coat on the surface of the seed, or a fluid in which to dip or steep the seed.

PRE-TREATMENT OF SOIL

Pre-treatment of soil may be a mechanical or a cultural method. Flooding, turning up the lower layers of the soil, or partial sterilization of the soil by burning the stubbles or leaves are some examples. It may be a biological method, as inoculating an antibiotic or a microbe which will prevent the spread of the microflora or insects harmful to the seed. Pre-treatment of soil is also done by chemical means, when pesticides and deterrents are introduced into the soil.

The soil, after the seeds have been put in, is treated in much the same way, except that methods like flooding and sterilizing the soil are not employed.

Chemicals used for treating the seed and the soil are—fungicides for preventing or controlling seed-borne fungal or bacterial infections, insecticides for controlling soil insects which attack seeds and planting material, and soil fumigants which free the soil of harmful micro-organisms, insects and worms.

FUNGICIDES

Organo-mercurial compounds are used for treating seed to control seed-borne diseases and also for protecting seeds from soil-borne fungi and bacteria. Blast and leaf spot of paddy, smut and leaf spot of *jowar*, and the blackarm disease of cotton are examples of such diseases. Ceresan (dry or wet), Agrosan GN and 'Agallol' (for protecting sugarcane setts, potato planting material, etc.) are some of the popular preparations for seed-treatment.

In dry seed-dressing treatment, each grain should receive a small and even coating of the dust. This is easily done in seed mixing drums. The grain and the required quantity of the chemical are put in, and the drum rotated for a few minutes to ensure a thorough coating. About eight to ten ounces of the chemical, Ceresan dry or 'Agrosan G.N,' will suffice for one gunny bag of seed grain (about 200 pounds).

The wet method is used where soaking of seed in water (as in the case of paddy which is soaked in salt water before sowing) is necessary. For wet seed-dressing, seeds may be dipped in 0.1 per cent water solution of Ceresan for about 30 minutes. Dipping sugarcane setts and potato cut pieces in 0.5 per cent solution of 'Agallol' ensures good germination and healthy seedlings.

INSECTICIDES

Insects which badly affect seeds and planting materials in the soil are termites, ants, wire-worms, ground-grubs (root-grubs) or larvae of cockchafer beetles, cut-worms, and maggots. Earthworms, millipedes, nematodes (eelworms) and mites are other pests. There are also the rodents, birds and even monkeys which scratch the soil and eat up the seed. Attack by these on seed and planting material results in a lower germination and a poor and patchy crop. In bad cases, the entire crop is ruined.

Against soil pests, soil insecticides may be applied to the soil, before sowing or planting, or applied in rows before or after planting. Or the transplants and seedlings may be treated by dipping in the insecticide solution.

BHC, 'Chlordane,' 'Toxaphene,' 'Aldrin,' 'Dieldrin' and 'Heptachlor' are some of

the insecticides in use against soil insects. The per-acre dosage, the method and time of application vary with the chemical, the crop and the soil pests concerned. Generally speaking, two to three pounds per acre if to be broadcast before planting and one to two pounds if to be applied in rows before or after planting, of any of these insecticides in the pure (technical) form will give good results.

Most of the insecticides are available in different formulations such as ready-for-use dusts, wettable powders and emulsifiable concentrates, and a suitable formulation of the required chemical has to be applied in the particular manner.

Field trials have proved 'Heptachlor' very effective against soil insects of various kinds like termites, ants, wire-worms, cut-worms, etc , and non-insect pests like earth-worms. Forty pounds of three per cent dust, or five pounds of 25 per cent wettable powder in 100 gallons of water, or five pints of 20 per cent emulsifiable concentrate in 100 gallons of water are the doses to be used. The doses may, however, be reduced in case the seed is sown in rows or planted wider apart.

SOIL FUMIGANTS

Where the soil has been seriously infected by such pests as nematodes, which will seriously affect the crops grown on it, soil fumigation is taken up. A soil, which though showing no lack of nutritive elements fails to yield a satisfactory crop, suffers from 'soil sickness.' This may be either due to the poor physical condition of the soil or due to a serious increase in number of soil-organisms such as eelworms and fungi. One method of setting right this condition is to sterilize the soil by heat if the area to be treated is small. Disinfection or fumigation of the soil with chemicals is another method. Carbon disulphide, coal-tar derivatives like P. D. B. (Paradichlorobenzene), Formaldehyde, D-D mixture (Dichloropropane—Dichloropropene), and Ethylene dibromide are some of the soil fumigants in use.

A WILT-RESISTANT CORIANDER

WILT, the disease which used to damage the coriander crop in Madhya Pradesh, can do no harm to the new coriander variety evolved at Gwalior.

The new variety is named *No. 5365*. It is small seeded (liked by the trade), and matures in 110 days. Apart from resisting the wilt disease, it gives a high yield of 12 to 15 maunds of seed per acre.

The variety can be grown well under dry or unirrigated conditions.

Seeds of the new variety are being made available to farmers by the Assistant Economic Botanist, Agricultural Research Institute, Gwalior, Madhya Pradesh.

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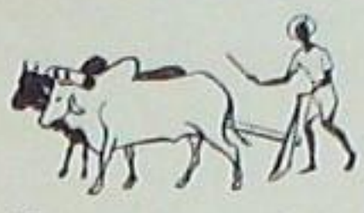
FOR PROGRESSIVE FARMERS



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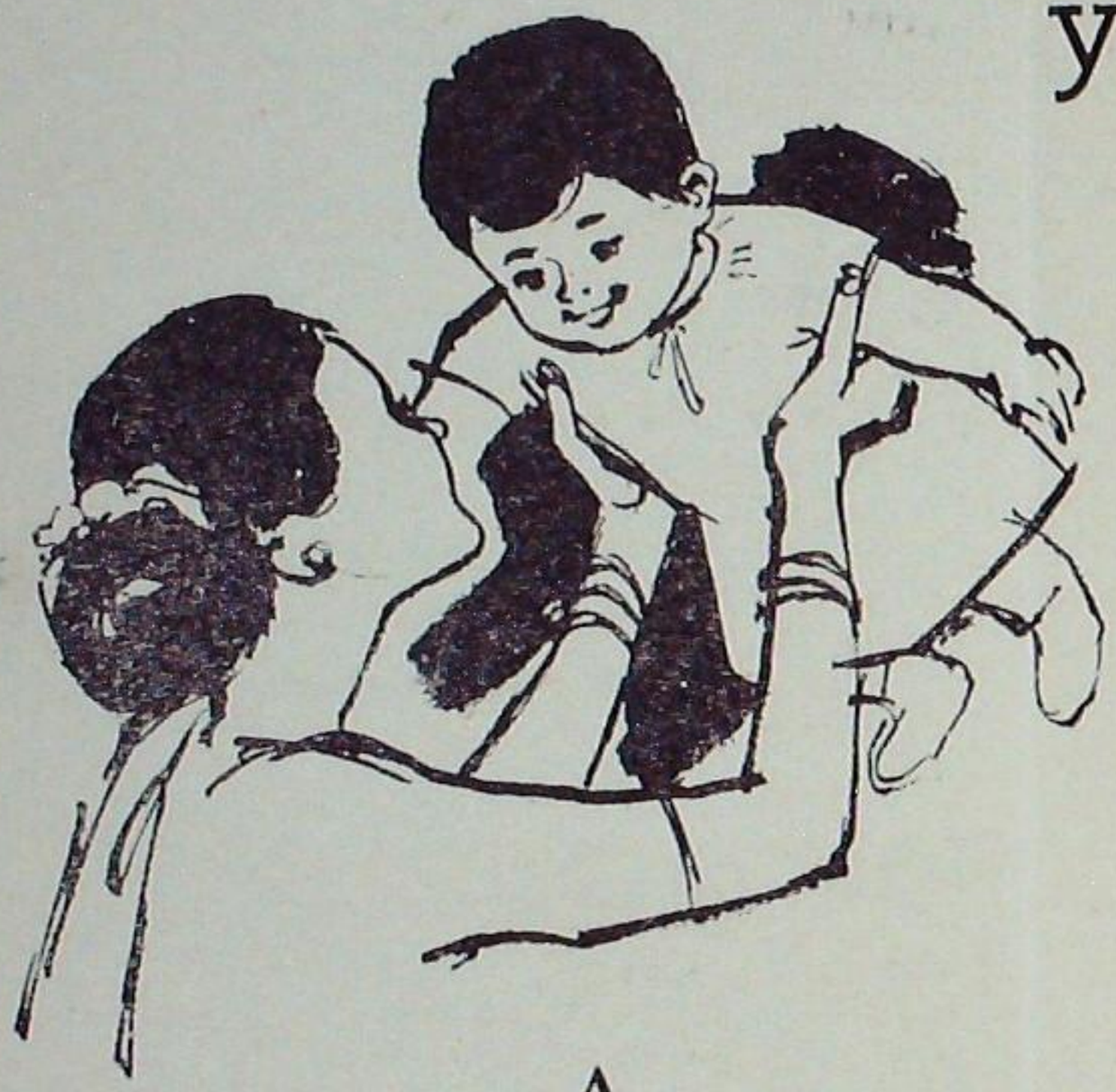
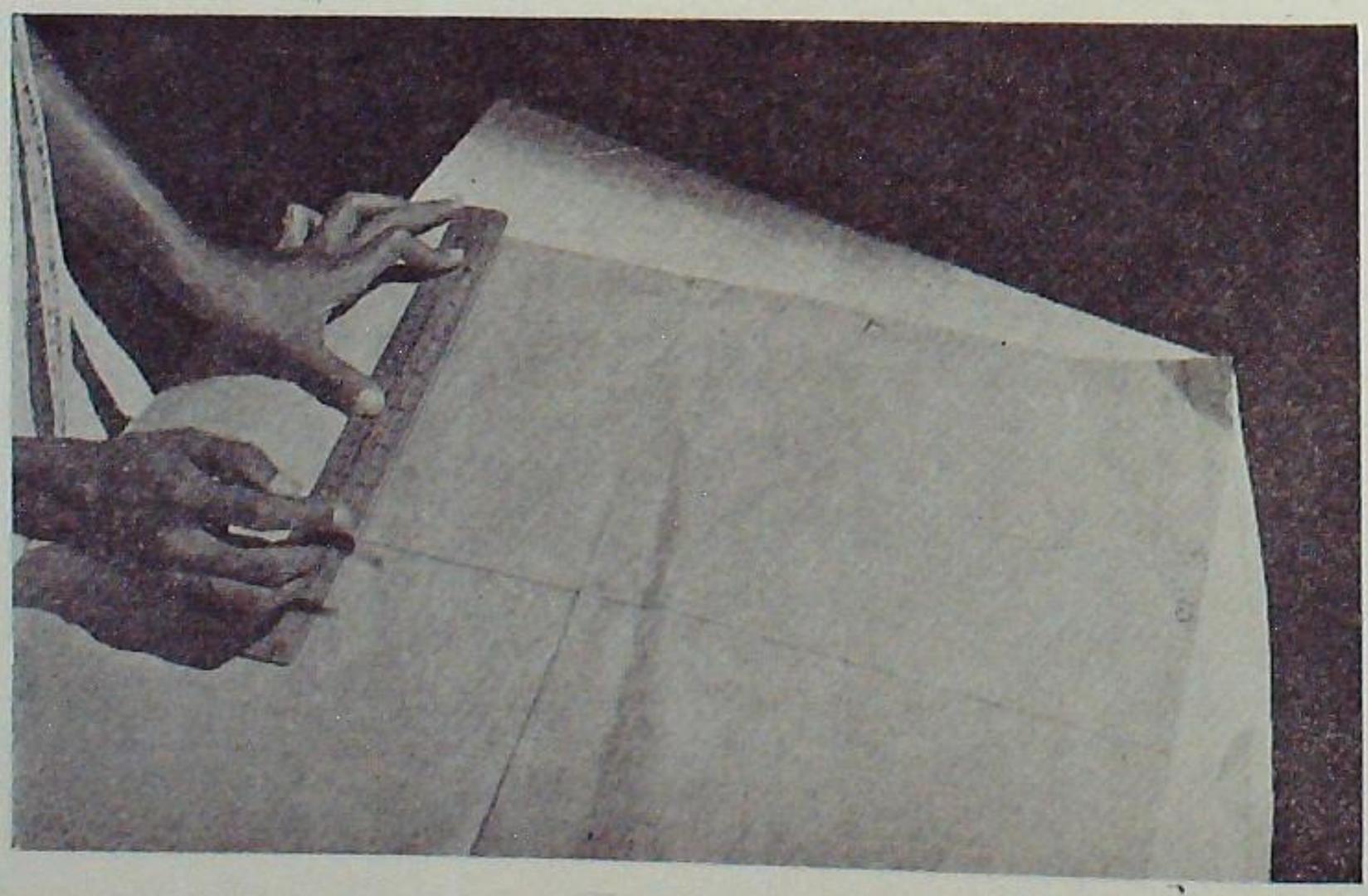
A jhabla will keep your baby cool

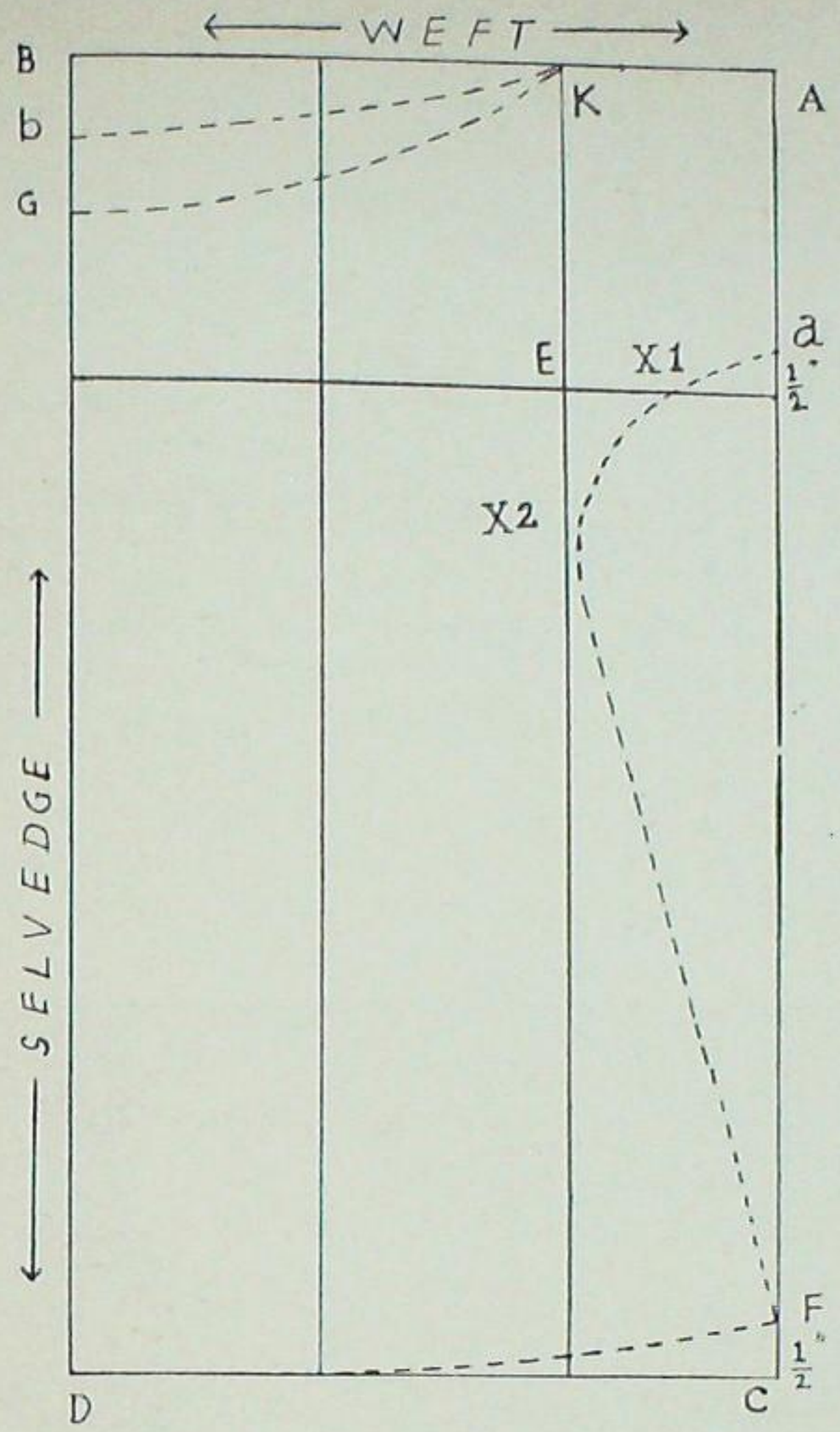
and comfortable too...



By KAMLESH PURI

A *jhabla* is what your baby needs. It is a dress that will keep him cool and comfortable. You can make a *jhabla* easily from any old piece of cloth if there's still life in it. And to cut out the dress neatly, better trace the design on a paper first.





Take a paper 20 inches × 20 inches and follow these steps :

Fold the width in half and keep the fold on the left, so that BA=DC=10 inches along the weft.

AC=BD=20 inches along the selvedge

Fold length into four equal parts and open out.

Fold the width into three equal parts and open out.

From B take one square down and then two squares out and mark the point as E. From E take one inch out and mark the point with X1. From E again take one inch down and mark the point with X2.

From A take one square less ½ inch down and call the point 'a'.

From C take ½ inch up and mark the point F.

Join X2 and F with a straight line.

Join 'a' and F with a curve passing through X1 and X2.

For the back neck line : Take from B two squares in, and mark the point as K.

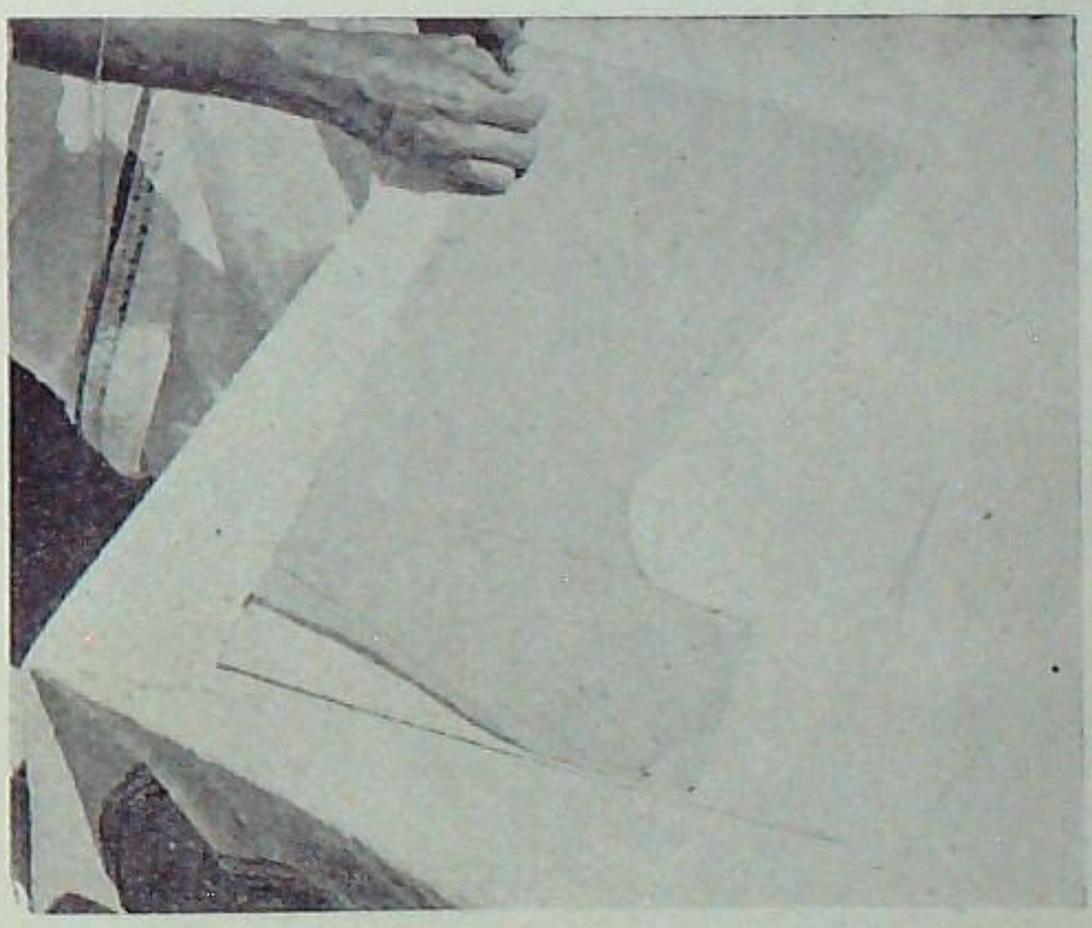
From B take ¼ square down and call it 'b'.

Join 'b' and K with a curve.

For the front neck line : From B take ½ square down and call it G.

Join G and K with a curve.

Cut out the paper pattern along the blue line.



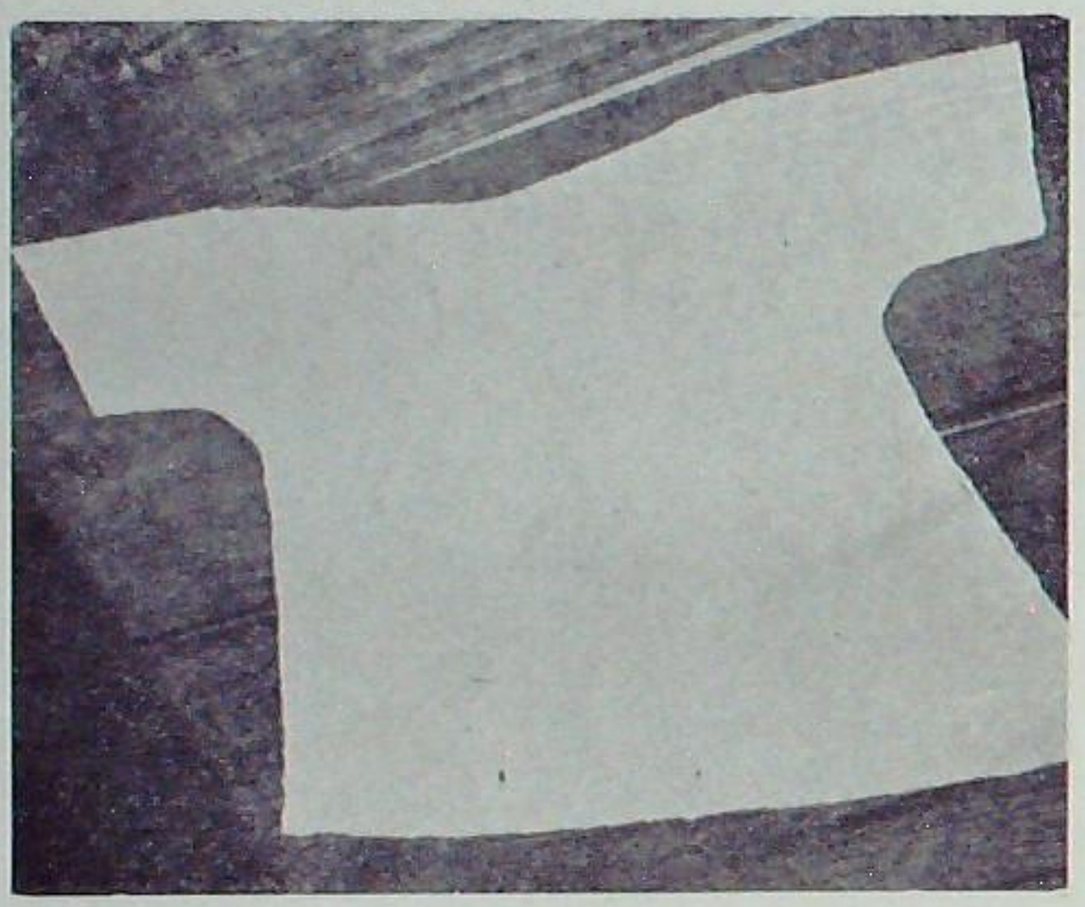
PLACING OF PAPER PATTERN ON THE MATERIAL

Examine the old saree, skirt or petticoat and choose a sound piece 42 inches by 22 inches.

1. Fold the material lengthwise and then widthwise keeping the fold on top and on the left.

2. Place the paper pattern on the material keeping the fold on the left.

3. Pin up the paper pattern to the material. Leave one inch of extra material along the armholes and the skirt for hem. Leave half an inch on the sides around the neck for the seams. Mark out and remove the pins.



Cut out the material, and open out the *jhabla*.

Mark the front-neck on the front piece and cut out ;

mark six inches straight down the centre of front-neck and cut through for the opening in the front.

Fold in one inch at the armhole. Tack and hem.

Tack and machine the side seams.

Attach a cross-way piece to the neck opening on the right side. Turn in, tack and hem.

Cut out a one-and-half inches wide cross-way piece to go round the neck.

Attach the cross-way piece around the neck on the right side.

Turn the work to the wrong side. Turn the cross-way piece on the wrong side. Tack and machine.

Turn one-inch hem at the skirt. Tack and hem.

Turn the work on the right side.

Thread the neck with a ribbon and turn right side out.

Damp it slightly ; iron out with a hot iron. And your *jhabla* is ready.

● ● ●

The author gratefully acknowledges the help rendered by Miss R. Raji, Lecturer in Home Science, Sri Avinashilingam Home Science College, Coimbatore, for arranging the demonstration on how to prepare a jhabla.

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