



**INTERIM REPORT**  
**OF THE**  
**NATIONAL COMMISSION ON**  
**AGRICULTURE**

**ON**  
**MULTIPLICATION AND DISTRIBUTION OF**  
**QUALITY SEED PERTAINING TO HIGH**  
**YIELDING VARIETIES AND HYBRIDS OF**  
**CEREALS**

**GOVERNMENT OF INDIA**  
**MINISTRY OF AGRICULTURE**  
**NEW DELHI**

**(NOVEMBER 1971)**



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## SUMMARY OF RECOMMENDATIONS

### *OVERALL PROBLEMS CONCERNING SEED*

#### *Watch on performance of varieties*

1. The seed of high yielding varieties of cereals that becomes available to farmers has to be of high quality. This should be ensured by the extension agencies by keeping continuous watch on their performance in the field. Advice and assistance of research stations, seed testing laboratories and Seeds Act enforcement agencies should be available to them. (Paragraph 3.5)

2. State seed inspection agencies (*viz.*, Seed Inspectors as appointed under the Seeds Act) should be responsible for initiating action on the established causes of low yields. They should take the required assistance of State certification agencies for this purpose according to needs. (Paragraph 3.6)

### BREEDER SEED

#### *Breeders' responsibilities*

3. The responsibility for multiplying breeder seed in adequate quantities for meeting the requirements of foundation seed agencies should be entrusted to certain selected breeders and institutions. It is necessary that quality checks be applied internally by breeders themselves on their produce, but the ICAR should develop a working proposition to involve themselves also in this task. Breeders should also evolve a system to organise field checks at the foundation and certified stages of seed multiplication. They should multiply adequate quantity of seed before releasing a new variety so as to preclude chances of short supply after release. (Paragraph 4.7)

#### *ICAR's responsibilities*

4. The ICAR should expeditiously lay down standard procedures for the production of breeder seed. Seed production research may be sponsored by ICAR as an important aspect

(ii)

on priority basis. The cost of production of breeder seed of all varieties in any college, university or institution must be treated as a committed expenditure on research. Breeder institutions should be responsible for maintaining always adequate stock of breeder seed and for this purpose proper storage facilities should be provided to them. Production of breeder seed should always be 25—50% extra over targeted requirement. (Paragraph 4.15)

## FOUNDATION SEED

### *Foundation seed organisation*

5. There should not be any monopoly by any single agency in the production of foundation seed. In respect of varieties of all-India importance, the National Seeds Corporation should be a major agency for production and distribution of foundation seed. The NSC should involve in the production of foundation seed, all Agricultural Universities, State Farms and other institutions, which are in a position to coordinate performance and quality. (Paragraph 5.6)

6. Production of foundation seed of local varieties should be the responsibility of State Governments, which should specifically nominate or create one or more institutional agencies for this purpose. Even so, the NSC, as a primary all-India foundation seed agency, must play an overall leading role in developing seed industry as a whole in the country. (Paragraph 5.7)

### *Assessment and Allocation Policies*

7. Foundation seed agencies should develop their own mechanism for assessing requirements of seed of different varieties and assume leadership in building appropriate certified seed producing and marketing agency or agencies so that foundation seed produced by them could be utilised in full. State Governments should conduct annual surveys of actual and estimated areas under high yielding varieties and hybrids. Such surveys should be coordinated at the all-India level by the Central Government. Results of such surveys should be widely publicised so as to be available to all concerned for making their own judgment of production. If there are any losses in seed production and distribution as a result of their own assessment by the agencies concerned, these would have to be squarely borne by the agencies concerned. But when production is taken up on the basis of specific governmental directives in connection with target-oriented

(iii)

programmes, losses, if any, should be borne fully by governments concerned. (Paragraph 5.12)

*Internal checks and certification*

8. Foundation seed agencies should evolve some system of applying internal checks of their own in order to ascertain quality of their product. They should also invite the breeders concerned to apply field checks. In addition, foundation seed must be got certified through State certification agencies. (Paragraph 5.14)

## CERTIFIED SEED

*Organisation to deal with certified seed*

9. Multiplicity of agencies should be encouraged in the field of production and marketing of certified seed. There are five possibilities in this respect, viz., (i) seed corporations, (ii) seed cooperatives, (iii) seed growers' organisations, (iv) agro-industries corporations, and (v) private agencies. All of these should be used both for production as well as marketing. Agro-industries corporations should be ordinarily used for marketing purpose only, but these could be utilised to enter into production programmes as well where governmental interests so necessitate. Overall coordination between various agencies suggested should be that of the State Department of Agriculture. (Paragraph 6.5)

*Government responsibility in production and assessment of certified seed*

10. Whereas agencies in the field of production and marketing of certified seed should, in general terms, have their own mechanism of assessment of seed requirement and subsequent production and marketing of seed, in so far as planned programmes are concerned, State Governments should bear direct responsibility for ensuring that their programmes are fully backed by their own assessment and production of the required quantity of certified seed. In such cases, they should undertake to ensure full off-take and proper storage of carry-over stocks, if any. (Paragraph 6.7)

*Constraints on the seed industry—cost of seed*

11. Extension media—both central and state—should be fully utilised for educating farmers in the use of quality seed.

(iv)

Demonstration programmes for the purpose of popularising high yielding varieties should be intensified so as to create growing market for quality seed and ensure reduction in the cost of seed. (Paragraph 6.11)

12. State Governments should give suitable financial concessions to concerned agencies dealing in certified seed against risks of large carry-overs and write-offs of damaged seed. (Paragraph 6.12)

*Constraints on the seed industry—credit facilities*

13. Proper arrangements should be made for financing seed industry as expeditiously as possible. (Paragraph 6.15)

*Watch over the progress of seed production and distribution*

14. Statutory committees set up under the provisions of Seeds Act at national and state levels should review and advise governments on the steps needed to be taken from time to time to ensure quick and steady development of seed industry. (Paragraph 6.17)

15. There should be separate State agencies for official certification of seed. The constitution of the Central and State Seed Certification Boards and action to extend financial assistance to certification agencies should be speeded up as much as possible. (Paragraph 6.20)

## SECTION I

### INTRODUCTION

1.1 One of the terms of reference given to the National Commission on Agriculture requires a study of the "requirements of the new strategy of scientific agriculture in the shape of requisite supplies of inputs and production requisites with special consideration of sources of supply and problems and, in particular, of multiplication and distribution of high yielding varieties of seed and other improved seeds

1.2 Seed is indeed the basic material on which prosperity of agriculture depends. It therefore deserves prime attention. The Government of India had appointed a Seed Review Team, which submitted its report in 1968. Its recommendations are still in the course of implementation, but in the meanwhile, in many programmes, which are afoot for introducing quality seed—specially of hybrids and high yielding varieties of cereals for giving a fillip to production of food crops, it is observed that yields have occasionally tended to decline with time. This trend has to be checked if the tempo of improvement in crop out-turns is to be maintained at a high level. There are also complaints of inadequacy of quality seed from time to time.

1.3 At present there is a systematic seed production programme of hybrids. Breeder seed and foundation seed are being produced and used in certified seed production programmes. In the case of varieties of wheat and paddy, however, systematic seed production does not seem to have been organised. There is no programme of production of required quantity of breeder seed, foundation seed and certified seed. The varieties are mostly spreading from farmer to farmer. As a result, in the field today, all kinds of mixture can be seen. Although high yielding varieties in most of the States are declared as notified varieties under the provisions of the Seeds Act, no steps seem to have been taken to organise production and supply of quality certified seed of high yielding varieties of wheat and paddy. This may result in quick deterioration and decline in yields. Areas most suited for production of seed of wheat and paddy also require to be delineated. It was therefore considered appro-



appropriate to devote attention firstly to important aspects pertaining to multiplication and distribution of quality seed of high yielding varieties and hybrids of cereals including millets. A committee of the Commission consisting of Dr. H.R. Arakeri, Dr. S.K. Mukherjee, Sardar Jogendra Singh, Capt. Rattan Singh and Dr. M.S. Swaminathan was consequently formed to go into the matter. They studied problems, consulted certain selected parties and formulated their preliminary views. On the basis of these views, a suitable questionnaire was issued to concerned authorities and experts to elicit their opinion. This questionnaire is given here in Appendix I and a list of addressees from whom replies have been received is given in Appendix II. The replies so received have been analysed and the salient features, which have emerged therefrom, are highlighted in this report. Our interim recommendations on these aspects are also given for prompt implementation. These recommendations, though primarily meant for cereals, will prove equally applicable to many other crops too.

## SECTION II

### REVIEW OF THE PRESENT POSITION

2.1 Importance of good seed is known to farmers in India since long. The Royal Commission on Agriculture (1928) had devoted attention to this aspect. The seed Review Team (1968) has rightly stated that quality seed offers great potentialities. It is the cheapest method of increasing agricultural production, requiring little or no foreign exchange but only organisation and effort on our part. It also stands for new technology, new cropping patterns and new methods of obtaining higher yields. The release of high yielding paddy and Maxican wheat varieties, hybrids of jowar, maize and bajra and many other crops have opened new vistas for seed industry in the country. As a matter of fact, farmers welcomed such varieties with unprecedented enthusiasm. Fifteen per cent of the area under foodgrains has already come under high yielding varieties. While the peak of prosperity through the use of good seed is yet to be attained, complaints are already being received that the quality of seed of high yielding varieties is deteriorating rapidly. There are also complaints that the seed that the farmer has purchased as high yielding variety has often been of mixed quality with a lot of off-types. This malady, if allowed to develop unchecked, is sufficient to dampen enthusiasm of farmers and thus ruin prospects of raising yields of food crops in the country. Consideration of preventive measures therefore does not brook any delay. It is apt therefore to highlight such aspects pertaining to production and supply of quality seed.

2.2 The causes of low yield can be any of the following:

- (i) use of low quality uncertified seed,
- (ii) use of seed of a variety not sufficiently tested under field conditions before release for general cultivation,
- (iii) genetic deterioration of seed,
- (iv) physical or pathological contamination of seed,

- (v) nutritional deficiency of soil,
- (vi) pests and diseases of crops,
- (vii) unfavourable weather, and
- (viii) non-adoption of cultural and manurial practices which are necessary to be followed along with the use of quality seed.

Out of these causes, (i) to (iv) pertains to seed alone. If seed is primarily bad, even the best methods of crop husbandry will have limitation to raise yield. Hence, seed requires utmost consideration. Seed is indeed the backbone of crop husbandry. For agricultural prosperity, it is necessary that the right quality of seed of right variety should be produced in right quantity and delivered in right time at the right place. This encompasses problems of breeding, multiplication and distribution of seed. If yields are always to be obtained appropriate to a particular variety, seed must necessarily be pure and viable in all the stages of multiplication, processing, storage and distribution.

2.3 Multiplication of seed involves three stages. These are:

- (i) Nucleus (or breeder) stage : The quantity of seed of a variety that a breeder has evolved is always small to begin with. The most important fact to be noted is that this small quantity has been produced under the supervision of the very breeder who was responsible for breeding the variety. This has obviously to be done in research institutes or farms where breeders are posted.
- (ii) Foundation stage: This is the stage when breeder seed is multiplied to make it available in larger quantity than in (i). This is also a stage when rigours of production which were applicable to breeder seed have to be maintained with equal strictness. Obviously, therefore, expert handling is necessary even in this stage; multiplication has therefore to be done in such farms where facilities are available for expert handling.
- (iii) Certified seed stage: This is a stage when foundation seed is further multiplied for becoming available in abundance so that it could be supplied to farmers in full quantities. This is achieved in a couple of more multi-

plication stages. Seed is generally multiplied on cultivator's fields, though still under technical guidance and supervision.

### *Historical*

2.4 Introduction of new varieties in India has throughout been mostly through governmental agencies. Breeding work was earlier done at Central Institutes like the Indian Agricultural Research Institute (IARI), and at State Government Research Farms where experts were stationed. With the setting up of Agricultural Universities, these also become places for breeding work. Foundation seed was produced at Government multiplication farms, while certified seed was produced almost entirely on cultivators' field, under procurement system of State Governments. Agencies for quality tests and certification were not developed to any significant extent.

2.5 But for the role of the Indian Council of Agricultural Research (ICAR), coordination in breeding programmes of States was more or less absent initially. It started developing later in States in the form of Agricultural Research Conferences (AGRESKO) and between States comparatively recently in the form of workshops for different crops held as a part of all-India Coordinated Projects. The First, Second and Third Plan periods also saw the growth of many seed farms.

2.6 The year 1961 was celebrated all over the world as the World Seed Year. It so happened that attention came to be paid in India too more seriously only in the sixties when, as a consequence of the pressure of growing population, the need for increasing foodgrains production became urgent. New hybrid of maize was released as early as in 1961 followed by the release of hybrids of jowar and bajra and high yielding varieties of paddy and wheat. This was all between the years 1961 and 1966. Farmers showed great inclination to accept these varieties. It encouraged the Centre to plan out a new strategy of agricultural development, one of the main aspects of which is what is now commonly known as High Yielding Varieties Programme. As a concomitant of this programme, it became necessary for the Central Government to think out means for multiplication and distribution of seed of high yielding varieties, which breeders produced. The National Seeds Corporation Ltd. (NSC) was started in the year 1963 to organise initially the production of small quantities of hybrid seed and

the seed of some specific vegetables. It was only in 1965 that the NSC was given the expanded role of producing foundation seed and initiating a programme of maintaining quality seed. In initial stages, the NSC had also to arrange for production and marketing of certified seed.

2.7 The first Seed Testing Laboratory was established in the year 1961 at the Indian Agricultural Research Institute (IARI) and a plan then began for the establishment of such laboratories in every State. The NSC with the help of IARI, the ICAR and the Rockefeller Foundation organised a fairly good system of seed certification by about 1965. Its activities encompassed States and gradually the Blue Tag of NSC became a hallmark of quality seed in the country.

2.8 A Central Seeds Act was passed by Parliament in December 1966. It became operative in October 1969. This marked the beginning of statutory provision for quality control of seed. To begin with, it made compulsory only the truthful labelling of seed material while certification of seed was even then kept only voluntary.

2.9 Rapid developments which took place in the sixties as a result of growing awareness of the importance of seed brought up many problems calling for fresh appraisal. A Seed Review Team was consequently set up by the Government of India in October 1967 for this purpose. It submitted its report in June 1968.

#### *Present Status*

2.10 The recommendations of Seed Review Team are comprehensive. These are still in the process of implementation. The crux of the problem that will continue to persist in the meanwhile is that yields from high yielding varieties are reported to be declining in some areas. A farmer is certainly not interested just to be told by experts as to why this so happens. What he is interested is to be assured that his yields shall not go below standard. For this, it is imperative that due vigil is exercised during all the three stages of multiplication. Problems relating to low yields from quality seed can arise at any of the three stages; these are briefly described below :

#### *Breeder Seed*

2.11 It has been observed that one of the aspects that is commonly neglected is the production and supply of breeder

seed of quality comparable with the original seed. The Seed Review Team examined this question in great detail and has stated as follows :

“Arrangements for breeder seed production are unsatisfactory at present. It is readily assumed that, just because seeds are supplied from research institutes, they would necessarily be pure. This will not be so unless research institutes have sufficient facilities and the breeders accept the responsibility for the supply of quality seed and pay special attention to the same. The Team recommends that the ICAR should lay down standard procedures for production of breeder seed. Facilities should be provided to research stations wherever necessary.

Sufficient interal checks should be provided for as in Sweden for checking the purity of breeder seed supplied from research institutes to ensure that it is of sufficient purity.”

2.12 Although it appears that some attempts have been made and are being made to improve the situation, the position more or less has remained the same as it was a few years ago. Important hybrids and high yielding varieties are the products of All-India Coordinated Projects. The main responsibility for production of foundation seed, therefore, rests on the NSC and it has to receive nucleus seed from breeders working in coordinated projects. There is some feeling in the NSC that breeder seed supplied to them for further multiplication is not of the desired quality. Exact position with regard to availability of breeder seed of varieties developed and released as a result of research carried out by various agencies outside the purview of the coordinated research projects is varying from state to state.

#### *Foundation Seed*

2.13 As per the recommendations of the Seed Review Team, the NSC has to develop primarily as a foundation seed agency. It has to give up certification, production of certified seed and marketing activities. It should concentrate on production and supply of foundation seed of quality of all-India varieties. It is suggested that assistance of State Governments, Agricultural Universities, etc. should be taken by the NSC in its production programme. It was also recommended that an agency be named in each state as foundation seed agency so that the seed of varieties released

locally could be produced and used without much difficulty. Similarly, it was expected that the responsibility of production of foundation seed of privately developed varieties would naturally be of those who developed the varieties.

2.14 At the present juncture, there are large number of varieties released by the Central Varieties Release Committee and a few have been released by State agencies and very few by private research organisations. The main All-India Foundation Seed Agency is the NSC. The Tarai Development Corporation (TDC) is mostly producing seed of varieties developed by the Pantnagar Agricultural University (U.P.) and is using the produce itself. Gujarat State Department of Agriculture also produces foundation seed, but it is used mostly in Gujarat. Some other State Departments have also started producing foundation seed of new varieties of wheat and paddy.

2.15 Examination of the problems faced by the NSC indicated that there was no adequate arrangement for assessing requirements of foundation seed of different varieties. Neither the State Governments nor the certified seed producing agencies were placing advance and firm indents. The NCS was going ahead with the production programme based on national targets as worked out by the Union Ministry of Agriculture, but the programmes of production of certified seed have not kept pace with it. As a result, the NSC is left with surplus stocks. Since the TDC and Gujarat State Department of Agriculture are producing foundation seed for a limited purpose, the problem does not appear to be so serious with them.

2.16 It was recommended by the Seed Review Team that facilities available with Agricultural Universities and State Governments should be fully made use of by the NSC for the production of foundation seed. At present, only a fractional quantity of the total foundation seed produced by the NSC is being produced at the State/Central/University Farms.

2.17 From the point of view of quality of foundation seed, it is seen that some complaints have been voiced in different parts of the country with regard to genetic as well as physical impurity and also in regard to germination. The NSC has explained that the quality of breeder seed has not been upto the mark and hence genetic impurity is observed in foundation seed. It is stated that steps have been taken by the NSC to get the foundation seed production plots examined by the specialists of the ICAR. It has also been stated that there are some complaints about germination of foundation seed supplied by the NSC.

### *Certified Seed*

2.18 The agencies that have been producing certified seed now are the NSC, the TDC, the State Governments, seed firms and private seed growers. The NSC may gradually withdraw from the production of certified seed, since it is required to concentrate on foundation seed production programmes. The TDC has a programme of production of seed of certain varieties and kinds only. State Governments have withdrawn or are withdrawing from seed production programmes and are gradually asking their Agro-Industries Corporations or other agencies to take up seed production and marketing. There are a few joint stock companies and cooperatives also who have taken up seed production and marketing. There are also a few individual seed growers who are producing and marketing seed of their own. State Governments, the NSC, the TDC, Agro-Industries Corporations, seed companies and cooperatives enter into contract with growers for seed production and supply on certain terms and conditions. There is no dearth of growers who can take up seed production on efficient basis. But these seed growers, excepting a few, do not wish to store and market the produce themselves. They are prepared to produce any quantity of seed on condition that it will be taken off their hands immediately after it is produced and paid for. So far, this function was performed by State Governments on a large scale. Now with the withdrawal of State Governments, sufficient organisations do not exist to take over seed procurement and marketing.

### *Scope*

2.19 From the foregoing, it appears that, considering the overall problems of seed production, there is need to exercise continuous vigilance over deteriorations of quality seed and take steps to get the problem of low yields analysed with the help of scientists whenever it happens. It is also necessary that demonstrations are arranged regularly to convince farmers of advantages of using quality seed of new varieties. When it is established that seed is not of desired quality, steps are required to be taken immediately to locate lapses that might have occurred in production, processing, certification or distribution and correct them with needed measures.

2.20 In so far as breeder seed is concerned, immediate need is to ensure that adequate quantity of breeder seed of good quality is always available.



2.21 As far as foundation seed is concerned, the chief problem is of surplus stock with the NSC and the quality of foundation seed. The NSC as an all-India foundation seed agency, has to play a leading role in developing seed industry for the country as a whole. Foundation seed agencies have to be developed in every State too. All these agencies have to develop their own mechanism for assessing requirement of different varieties and assume leadership in building appropriate certified seed producing and marketing agencies so that foundation seed produced by them could be utilised in full. The NSC has to make efforts to involve Agricultural Universities, State Farms Corporation and State Governments in its foundation seed production programme and make fullest possible use of facilities available with them.

2.22 In so far as certified seed is concerned, it has already been stated that, with the withdrawal of State Governments from the field of seed procurement and marketing, there is a gap existing at present in this field. State Governments need not revert to take up the functions of marketing of certified seed, but it is necessary to ensure that appropriate policy decisions are announced and proper atmosphere is created for the development of seed industry on sound basis through Agro-Industries Corporations, special seed corporations like the Tarai Development Corporation, seed cooperatives as in Mysore State, private firms like the ones in Maharashtra, or seed growers' organisations as in Tamil Nadu. There is no doubt that many farmers small and big have acquired or can acquire the needed know-how of seed production. What is, therefore, needed is organisations to take up procurement, storage and marketing.

2.23 Organisations will have to run on commercial basis. They will have the same difficulties as foundation seed agencies with regard to assessment of requirements and planning for production in such a way that there will not be large carryover of stocks. There are, in addition, inherent difficulties of surpluses and shortages due to increase or decrease in seed yields and also increase or decrease in demand for seed due to vagaries of weather and many other factors. Some areas are better suited for seed production than others. Although yields may be high and cost of production low in some pockets, risks may be more due to vagaries of weather. Taking all these factors into consideration, seed agencies will have to assess needs on their own and plan for production in concentrated but dispersed pockets, rather than spreading over vast areas, and arrange for

carryover of appropriate stocks from year to year. Finally, price structure will have to be such that it would provide for all reasonable costs on various items mentioned above and also for reasonable percentage of losses and profits. Profit margin has to include requirements for financing research to enable further growth of seed industry.

2.24 State Governments have also to watch carefully programmes of various agencies and provide necessary incentives from time to time and ensure development of seed industry on right lines so that farmers are assured of continuous supply of quality seed.

2.25 The Department of Agriculture in the Union Ministry of Agriculture at the national level and State Departments of Agriculture will have to ensure coordinated planning and implementation of seed production and distribution programmes.

2.26 There are many aspects that are required to be looked into in detail, such as private research, breeders' rights, release of varieties on the one hand, and building up of supporting facilities like processing and storage of seeds on the other. Availability of credit facilities to seed growers as well as to seed dealers will have to be considered in detail. Pricing structure has to be attractive to seed growers, seed dealers as well as to consuming farmers. Various incentives will have to be provided for the development of seed industry as a whole. It will have to be seen that seed certification and inspection organisations are developed to required extent. Lastly, farmers will have to be made aware of the provisions of the Seeds Act and of advantages of using quality seed. Detailed recommendations have been made by the Seed Review Team on all these aspects. It is not proposed to go into these details now. For the present, it appears sufficient if steps are taken to build up required organisations for dealing in seeds.

## SECTION III

### OVERALL PROBLEMS CONCERNING SEED

3.1 The quality of seed when it reaches the farmer should be as pure as it is when it leaves the breeder so that the farmer is always assured of a maximum possible yield. The lacuna at present is that there is no mechanism at field level to keep due vigil for this purpose.

#### *Watch on Performance of Varieties*

3.2 There is a general agreement in the replies received to our Questionnaire that constant watch on the performance of high yielding varieties should be exercised by extension agencies, and that in doing so, extension agencies should take the assistance of research stations, seed testing laboratories and Seeds Act enforcement agencies. Assistance of research staff is necessary because examination of crop performance involves many technical aspects which can be dealt with only by competent qualified personnel available at research stations.

3.3 The following guidelines can be of use in organising vigil over the performance of high yielding varieties :

- (i) Varieties chosen for official programmes of production should ordinarily be those approved either by the Central or State Variety Release Committee.
- (ii) Pre-release publicity regarding new varieties should be strictly avoided and varieties should not be released prematurely.
- (iii) Farmers should be encouraged to purchase only labelled seed. It should be ensured that there is no fraud in the sale of seed. Farmers should specifically be cautioned against the use of such varieties which have not been certified by any recognised seed certification agency. Particularly, they should not buy seed of miracle quality out by unscrupulous fellow farmers, who may have obtained seed material by surreptitious means.
- (iv) Once due quality of seed has been ensured, it should be seen that appropriate agronomic practices are adhered

to and crops are not raised under sub-normal conditions.

- (v) Samples of seed material sown should always be preserved and samples of yield from that seed material should also be obtained at the time of harvest and in the case of low performance, both such samples should be referred to the original breeder as well as seed testing laboratory. For judging performance of crop, it is not enough if only yield is observed, but it is equally important to watch constantly crop growth in field at all stages.

3.4 If the cause of low yield has been narrowed down to quality of seed as a result of the above procedures, it should also be possible for extension workers to know with the aid of seed testing laboratories whether the cause lay in poor genetic quality, or contamination or decay in storage. The first job in any of these cases is to compensate the farmer. It has been suggested that in such cases the distributor concerned should replace or refund the cost of seed. If the cause is physical impurity or damage and if it recurs, it is even suggested that the dealer concerned should be disqualified from seed industry.

3.5 We recommend that extension agencies should keep a continuous watch on the performance of high yielding varieties of cereals reaching the farmer. Advice and assistance of research stations, seed testing laboratories and Seeds Act enforcement agencies should be available to extension workers. If it is found that low yields were due to non-adoption of recommended practices rather than due to quality of seed, extension agencies should train up the farmers concerned. If the cause is found to be in the quality of seed, necessary corrective measures should be initiated.

3.6 We also recommend that the State seed inspection agencies (*viz.*, Seed Inspectors as appointed under the Seeds Act) should be responsible for initiating action on the established causes of low yields. They should take the required assistance of State certification agencies for this purpose according to needs. If it is proved that the seed supplied to a farmer had deteriorated or was infested or contaminated, he should be put in a position to return the package to the agency concerned and get a replacement in good condition. It should be ensured that all seed supply agencies should observe this as a uniform rule to keep up their reputation.

## SECTION IV

### BREEDER SEED

4.1 The need with regard to breeder's seed is that it should always be of the highest quality and it should be available in abundance on a regular basis.

#### *Breeders' Responsibilities*

4.2 Breeding for new varieties is a continuous process in our agricultural colleges, universities and institutions. The development of a variety may be the result of team work, but the responsibility for maintenance of purity and multiplication of breeder seed is normally assigned to a particular scientist in an institution. Even in the Coordinated Research Programmes sponsored by ICAR, it should be possible to identify a particular institution as responsible for the variety that has been released. For proper organisation of the production of breeder seed, it is necessary to identify for each of the varieties, which are important for field programmes, an institution which should maintain breeder stock and such an institution should nominate a section with a scientist as its incharge to maintain its stock and purity. This procedure is favoured in most of the replies to the questionnaire. It is also agreed therein that this arrangement of fixing responsibility on certain selected breeder can come into force from June 1972. As far as the Central varieties are concerned which are issued (i) from the central institutions, (ii) as a part of the Coordinated Research Programmes, and (iii) for export and industrial production, the responsibility of selecting breeders or breeding institutions can be that of ICAR, while for all varieties issued from State institutions and universities, the States have to nominate breeders.

4.3 If any defect is found in the quality of breeder seed, it is actually the reputation of the breeder and the institution concerned which is at stake. Therefore, it is in the interest of the breeder institution that a sound system of internal checks is developed for internal application. Scientists within an institution should apply rigid tests on their product before they introduce them or multiply them for the sake of foundation agency.

4.4 Breeder institutions also come into picture indirectly when genetic quality of their seed is questioned at the subsequent stages of foundation or certified seed production. Therefore, it is in their interest that they should develop and take interest in a system of periodical inspection of foundation seed fields in order to apply performance tests. They should arrange for visits of their experts to such fields during critical phases of growth and at the time of harvest too. Such tests should be applied for every crop raised from breeder seed every season or every year, as the case may be. It may be added at the end that the ultimate responsibility for certification of foundation and certified seed is cast upon the certification agency under the Seeds Act. As such, breeder institutions and certification agency should have some automatic mechanism of mutual consultation in this respect.

4.5 Majority of the replies are in favour of internal checks being applied by breeder institutions themselves. This is because inspection by outside scientists is beset with many problems. Either scientists may feel shy of pointing out defects in their colleagues' production arrangements or, taking the other extreme, they may overdo their job by giving undue importance even to minor matters. Because of this and because, after all, scientists concerned realise that their own reputation will be at stake if their produce is found fault with, it seems that the system of internal checks should ordinarily work with desired effect. Even so, there may be some special situations when the system of internal checks, however, well meaning it might be, may not be able to carry conviction with outsiders. For example, if a certification agency checks a stock of seed of foundation agency and finds it below standard, the foundation agency might as well plead that breeder seed supplied by the concerned breeder could have been defective. In such contingencies, external checks will seem justified, for which the ICAR seems a proper body to formulate and undertake appropriate steps. One of these steps may be to organise inspection groups.

4.6 Breeder's reputation is also involved if the stock of seed of a variety released by him falls short of demand. There is another danger inherent when breeder seed is insufficient for multiplication as foundation seed. In such a circumstance, there is likelihood of farmers being cheated by passing on to them off-type seed as genuine by unscrupulous agencies. It is, therefore, necessary that breeders must ensure that adequate quantity of seed has been multiplied before release of varieties is announced.

4.7 The Commission recommends that the responsibility for multiplying breeder seed in adequate quantities for meeting the requirements of foundation seed agencies should be entrusted to certain selected breeders and institutions. Selection of breeders and institutions for this purpose should be done by the ICAR for centrally controlled institutions and programmes and by the States for their own respective jurisdictions. It is necessary that quality checks be applied internally by breeders themselves on their produce, but the ICAR should develop a working proposition to involve themselves (ICAR) also in this task in such a manner and at such a stage that the authenticity of breeder's claim of quality becomes unchallengeable in times of dispute. Breeders should also evolve a system to organise field checks at the foundation and certified stages of seed multiplication. They should multiply adequate quantity of seed before releasing a new variety so as to preclude chances of short supply after release.

#### *Responsibilities of ICAR*

4.8 The role of the ICAR in matters of (i) selection of breeders and institutions for multiplying breeder seed and (ii) applying quality checks on breeder seed production has already been referred to in paragraph 4.7. Other responsibilities of the ICAR are described hereafter.

4.9 The Seed Review Team has already recommended that ICAR should lay down standard procedures for the production of breeder seed and that they should provide necessary facilities to concerned research station. There is general agreement in the replies that the ICAR is the logical agency for coordinating seed production research. It has been suggested that a coordinated research programme on procedures for production of breeder, foundation as well as certified seed of various crops should be started in institutions already involved in research work on various crops under the all-India coordinated programme and that the overall programme may be under the control of the ICAR. Another suggestion has been that there should be a separate division in every Agricultural University for research on methods of seed production in general and procedure of production of breeder seed in particular, and that this division may look to all aspects of seed technology. The ICAR may coordinate the functions of seed technology divisions of States through the Seed Technology Division of the Indian Agricultural Research Institute. Many of the Agricultural Universities support such an idea.

4.10 One aspect which is of prime importance and where ICAR can profitably lay down standards is the procedure for pre-release trials of varieties before these are recommended for general cultivation. It appears necessary now that a variety must be tried at least for a season widely under field conditions at government farms and also at selected farmers' fields. If such a variety passes field test satisfactorily only then it should be considered mature for release. At present, there is a ban on pre-release trials on varieties on farmers' fields. There is history for this. When the dwarf Mexican wheats were initially released, a few growers, who managed to get quantities of pre-release seed for their lands, made fantastic profits. In order to avoid complaints of favouritism on the part of scientific workers, a general order was passed that pre-release trials shall be only on government farms under strict supervision. Trials on government farms, however, do not represent conditions of farmers' fields and as ultimately it is the latter over which the performance of a variety rests, it is imperative that farmers' field must come in the picture for testing the final performance of a variety before its introduction on a large scale. Now that seed trials can be on a very large scale and widespread, the danger of any one farmer appropriating bulk of pre-release stock is negligible. It, therefore, appears to be the need of the hour that the previous policy should be revived and pre-release trials should be conducted at as large a number of farmers' field as possible. Such a procedure will go a long way in reducing complaints of failure of a variety to keep up to its reputation based only on restricted trials under conditions of government farms.

4.11 In matters of quality of breeder seed as supplied to foundation seed agencies, it has to be recognised that important hybrids and high yielding varieties are the products of all-India Coordinated Projects and that the main responsibility of production of foundation seed of these varieties has rested with the National Seeds Corporation. There is a feeling with the NSC that breeder seed supplied to them was not of the desired quality. The ICAR has stated that a scheme was formulated as a part of the Fourth Plan which included production of breeder seed of rice and wheat, but that the scheme had to be shelved for want of finance. This raised a very pertinent question as to what should be the financing policy for producing adequate stock of breeder seed. A suitable question was consequently included in the questionnaire issued by the Commission and almost a near unanimity is found for the view that the sale price of breeder seed should itself be such that it should support multiplication pro-



gramme without necessitating separate schemes. The NSC rightly cautions in this connection that only the cost of actual production and not breeding cost, nor overhead charges, etc. should determine the final cost of breeder seed.

4.12 Closely interlinked with the problems of (i) quality and (ii) regular supply in abundance of breeder seed are the questions as to how much seed should be multiplied, who should be responsible for its storage and in which way.

4.13 Should breeders produce an extra quantity of breeder seed over and above the indented quantity in order to provide for unforeseen fluctuations due to weather or other reasons? This question is linked with another question whether there should be arrangements for storing certain quantity of breeder seed from year to year and if so, whether it is necessary for a breeder to multiply extra quantity over the indented quantity as suggested to begin with. Majority of the replies state that breeders can produce about 25% over the indented requirement and that there should also be provision for storage of certain quantity from year to year, but there is no clear-cut indication in replies whether, in the latter case, there is need for the former at all. Some of the State Governments are of the view that a stock equal to about 50% of the normal annual requirement should always be kept in reserve and that this stock may have to be produced initially in excess and stored. It is further suggested that subsequently the production of breeder seed from year to year should be limited only to the requirement as collected from foundation seed agencies and that such seed produced every year should replace the seed in storage which should be released for multiplication as foundation seed. In view of this, it does not seem necessary that breeders should produce an extra quantity of 25% over the indents. Another view is that this aspect should be taken care of by organisations responsible for foundation seed production and that they themselves should include such an extra allowance in their indents.

4.14 Another important question is regarding the agency which should be responsible for storage of breeder seed thus multiplied. The weight of evidence is in favour of breeding institutions rather than foundation seed agencies. Storage houses should have such appliances of dehumidification and refrigeration as are necessary to ensure viability of seed for a period of two or three years. As such kind of storage plants are

not common in seed godowns, these will have to be specially built and this precludes the possibility of utilising hired accommodation.

4.15 We recommend that the ICAR should expeditiously lay down standard procedures for the production of breeder seed as required by the Seeds Review Team. Seed production research should also be sponsored by the ICAR as an important aspect on a priority basis. They should formulate proper policies and plans in this respect. Such policies should include procedures for conducting pre-release trials of varieties on farmers' fields. The cost of production of breeder seed of all varieties in any college, university or institution must be treated as a committed expenditure on research and there should be assured funds from the committed budget for this purpose so that the work does not suffer in quality and quantity for lack of funds at any stage. For varieties, which are for large field programmes, quantity of breeder seed should be such as is recommended from time to time by appropriate authorities. Cost of production of breeder seed can subsequently be recovered at the stage of its sale for production of foundation seed by charging a suitable per unit rate. Breeder institutions should be responsible for maintaining always adequate stock of breeder seed and for this purpose proper storage facilities should be provided to them. Vagaries of weather can often upset production. In order to meet such contingencies, aim should always be for producing some excess over targeted output. This may be made to range anywhere between 25% and 50% according to situations. Storage charges can also be included in the price of breeder seed.

## SECTION V

### FOUNDATION SEED

5.1 The chief problems are : (i) the agency which should play a leading role, (ii) assessment of requirement of foundation seed of different varieties and (iii) ensuring quality of seed.

#### *Foundation Seed Organisation*

5.2 The Seed Review Team had recommended that the NSC should be the primary agency for the production of foundation seed of hybrids and varieties of all-India importance. The Union Ministry of Agriculture informs that this recommendation has been accepted by the Government of India. There are various considerations in favour of this outlook. Commercial considerations are in themselves weighty. Foundation seed, like breeder seed, is costly to produce and carries huge financial risks. It not only requires heavy investment in the shape of working capital for procuring seed at high cost but also locks up capital in carrying huge stocks. There is also greater risk of write-offs and losses due to obsolescence of varieties. Moreover, considerable skill, care and experience are necessary in the production of foundation seed. To illustrate : clean land; proper isolation; equipment; sanitation; special production, harvesting, threshing and processing facilities are needed and conditioned storage is also essential. Over-production or under-production are not desirable. For these reasons, the number of foundation seed producing agencies are required to be kept to a minimum. There are many varieties of a particular crop whose seed has to be produced each year. Further, it may be necessary to produce foundation seed in specific agro-climatic conditions which may not be obtainable everywhere and therefore it may become necessary to select the most favourable areas for multiplication work. It is here that the advantage of a central agency over localised agencies stands out conspicuously.

5.3 Notwithstanding the aforesaid arguments, majority of the replies to questionnaire do not favour any monopoly by the NSC even in the sphere of all-India varieties. One particular

view is that, for a vast country like India, it is impossible for any single organisation to produce requisite quantities of foundation seed of high quality for all crops. The NSC, in addition to being an agency for production of foundation seed, could perform the function of coordinating the production of foundation seed in the country by holding annual meetings at which the requirement and production of seed by various agencies could be discussed. Agricultural Universities and other research institutes having requisite facilities must be encouraged. Private sector seed growers should also be encouraged to produce foundation seed of varieties developed by them. It is very important that certified seed producing agencies should have complete faith in the quality of foundation seed and hence should have a choice with regard to the sources from which they can obtain such seed. An overwhelming evidence of replies is also in favour of associating in the task of foundation seed production programmes all Agricultural Universities and such State Government Farms and Institutes which have requisite facilities.

5.4 Agencies other than the NSC already exist in many States to cater to local requirements. Uttar Pradesh depends upon the TDC and Agricultural Institute (Kanpur). Assam and Meghalaya have the Assam Seeds Corporation. In many other States, the State Departments of Agriculture themselves look after this function and take mostly the help of their Agricultural Universities and Government Farms.

5.5 The problem has to be viewed from several aspects. A strong central agency has several advantages as already enumerated. At the same time, considering the paucity of expert personnel in the country, all places where they are available and which can be used for production of foundation seed should be brought into production complex. This supports the pleas that Agricultural Universities and State Farms, where competence is available, should be brought into the complex. The demand for foundation seed may be vast for several varieties, which are required for large scale field programmes. In such cases there is advantage in the work being distributed among several agencies. This will also, to some extent, keep alive the spirit of competition and ensure quality. There is a tendency to argue that the easier and more remunerative aspect of foundation seed production should be left to various state agencies and that the central agencies should take only difficult and risky items including buffer stock operations.

5.6 Taking all the above mentioned aspects into consideration, the Commission recommends that there should not be any monopoly by any single agency, either the National Seeds Corporation or States, in the matter of production of foundation seed. In respect of varieties of all-India importance the NSC should be a major agency for production and distribution of foundation seed. There should, however, be other agencies too in States which should participate in the multiplication programme of varieties of all-India importance. The policy of assignment of functions of the NSC should be so modified as to enable it to involve in the production of foundation seed all Agricultural Universities, State Farms and other institutions which are in a position to coordinate performance and quality, and the NSC should try to organise seed production through them to the maximum extent possible. When demand for any variety of all India importance or any hybrid seed is very large and poses large scale production problems, the NSC should distribute the work to other institutional agencies instead of trying to expand its own organisation to a degree where supervision begins to suffer.

5.7 We also recommend that the production of foundation seed of local varieties should be the responsibility of State Governments, which should specifically nominate or create one or more institutional agencies for this purpose depending upon their circumstances. Such agencies should be notified by all States in order to avoid ambiguity. Even so, it is re-emphasised that the NSC, as a primary all-India foundation seed agency, must play an overall leading role in developing seed industry as a whole in the country. A get-together of State foundation seed producing agencies should be organised annually by the NSC. In such meetings, the distribution of production work of foundation seed for the next round can be decided upon. Such meetings should also be attended by representatives of the Union and State Departments of Agriculture. The presence of Government representatives will be useful for resolving any difference of opinion which may arise among the participating agencies.

#### *Assessment and Allocation Policies*

5.8 It emerges that the NSC has to be the leading central agency for foundation seed, while each State should also have at least one such agency. The NSC, and for that matter every other foundation seed agency, has to function as a commercial organisation. It would be ideal if foundation seed agencies can have requirements or orders in advance from various certified

seed producing agencies, but this is not always possible in practice. Therefore, foundation seed agencies should have their own assessment made. It is obvious therefore that the NSC and State foundation seed agencies themselves will have to make very realistic assessments of seed requirements before embarking upon actual production. They will surely have to take the help of the Central and State Governments as well as certified seed producing and marketing agencies in this task. There is agreement in the replies that State Governments should have a hand in the assessment problem. It has been suggested that Governments should conduct annual surveys of area planted to high-yielding varieties and hybrids and percentage that should be seeded to improved varieties. The results of this survey should reach all connected with seed business. Such data would give them a basis on which they can make their own decisions. It is obvious that such surveys have to be conducted by State Governments and their all-India coordination will have to be done by the Central Government.

5.9 What has been said above applies to the problem of assessment in general, but our's is a planned economy where governments also launch their own programme for propagation of specific varieties according to fixed targets. In target-oriented programme it is not difficult to forecast seed requirement well in advance and governments concerned can always give specific directives to foundation seed agencies to arrange for requisite production of foundation seed and offer to buy all the seed thus produced at a mutually agreed price. It follows as a natural consequence of government initiated programmes that, if any losses occur due to poor off-take of seed, these have to be fully compensated by governments concerned.

5.10 It will be in their own interest if foundation seed agencies see to it that their produce is fully utilised. Therefore, they will have to provide leadership in promoting certified seed producing and marketing agencies also. There is a view that a part of the cost of such promotional work could be met from the built-in margin of the sale of foundation seed. Foundation seed agencies should, however, promote such agencies in consultation with State Governments in order to ensure a coordinated approach. Both the Centre and States should give in their respective jurisdictions suitable tax rebates and other incentives, such as cheaper credit, to foundation seed agencies to fulfil their promotional role. They have also to provide financial assistance on running as well as capital charges. This is essential because foundation seed agencies always run a risk of large left-overs of seed stock

due to varieties often becoming obsolete or unpopular or due to replacement of older varieties by better ones. This assistance can be in the form of interest-free loans and subsidies over storage charges involved in long period of storage in specialised godowns (where temperature and humidity are controllable).

5.11 Closely linked with the job of foundation seed agencies, both with regard to themselves and with regard to their promotional role, is the question of allocation of seed. The development of a healthy seed industry very much depends upon a proper allocation policy. How should breeder seed be allocated to foundation seed agencies and how should they allocate foundation seed to certified seed producers? It is gratifying to note that the Central Seed Committee is already seized of the problem of fixing norms in these respects. Governmental programmes again do not present any difficulty, because their assessment of requirement is always known from fixed targets and the requirements, having been known, can always be referred to Seed Committees and the NSC and/or the State foundation agencies for working out need with respect to breeder, foundation and certified seed. Seed Committees can then distribute responsibility for the production of seed to various agencies. These committees can assist the concerned agencies in the job of non-targeted allocations too. As far as general principles which should govern allocation are concerned, many replies emphasise the point that allocation should be on the basis of experience and facilities available with the parties concerned. Facilities should include area and location of fields, provision for isolation and means of harvesting, handling, cleaning, processing and storage. The next consideration in allocation policy can be that major allocations should be made to the foundation or certified seed agency (as the case may be) in the area of major adaptations of a given crop. This will be particularly helpful in making selections specially when the breeder or foundation seed is in short supply. When, on the other hand, breeder or foundation seed is not a limiting factor, allocation can be made on the basis of 'first come first served'.

5.12 The Commission recommends that foundation seed agencies should develop their own mechanism for assessing requirements of seed of different varieties and assume leadership in building appropriate certified seed producing and marketing agency or agencies so that foundation seed produced by them could be utilised in full. Seed Committees should help these agencies in their assessment and allocation tasks. For making the

job of assessment easy, State Governments should conduct annual surveys of actual and estimated areas under high yielding varieties and hybrids. Such surveys should be coordinated at the all-India level by the Central Government. Results of such surveys should be widely publicised so as to be available to all concerned for making their own judgment of production. The Central Government and the ICAR should also lay down as quickly as possible such suitable allocation policies as are necessary for the growth of a healthy seed industry. It should be emphasised finally if there are any losses in seed production and distribution as a result of their own assessment by the agencies concerned, these would have to be squarely borne by the agencies concerned. But when production is taken up on the basis of specific governmental directives in connection with target-oriented programmes, losses, if any, should be borne fully by governments concerned.

#### *Internal Checks and Certification*

5.13 The NSC itself states that foundation seed agencies should conduct simple grow-out trials of seed lots produced each year to observe quality and that the concerned plant breeders should be invited to inspect foundation seed production of their varieties as often as practicable. This procedure appears quite satisfactory for applying internal checks by foundation seed growers, but ultimately, of course, official certifying agencies should be responsible for approving or disapproving foundation seed. Seeds Act also lays down that foundation seed must be certified. Certification could be got done through State certification agencies.

5.14 The Commission recommends that foundation seed agencies should evolve some system of applying internal checks of their own in order to ascertain quality of their products. They should also invite the breeders concerned to apply field checks. In addition, foundation seed must be got certified through State certification agencies.



## SECTION VI

### CERTIFIED SEED

6.1 One main need of the hour is that sufficient organisations should be built up which can take over procurement and marketing of certified seed in order to maintain the tempo for increasing agricultural production through the use of superior seed.

#### *Organisation to deal with Certified Seed*

6.2 Five alternative agencies are possible for the purposes of production and distribution of certified seed. These are (i) seed corporations, (ii) seed cooperatives, (iii) seed growers organisations, (iv) agro-industries corporations and (v) private agencies. A minor cross-section of replies does not favour involvement of agro-industries corporations in production programmes, because these are engaged in various other activities too and hence it is felt that they may not be able to do the job with exclusive efficient devotion. Even so, agro-industries corporations can take part in at least procurement and marketing in the place of government departments. But for this limitation, majority of the views are in favour of the principle of multiplicity.

6.3 As a matter of fact, there is an urgency for organising systematic programmes for multiplication and distribution of quality seed of high yielding varieties of paddy and wheat, because such a system for these crops has not developed so far to the extent desired to maintain production at a high level. This is a field waiting for immediate attention of these agencies.

6.4 In view of the multiplicity of agencies preferred, the responsibility of coordination and development could vest with the State Governments. State Departments of Agriculture could obtain definite commitments from different agencies in regard to supplies to be made by those agencies. To the extent there is a shortfall, the Departments themselves could arrange to procure the requisite quantity to fill up the gap and, wherever necessary, they might even arrange to contract for production. Maharashtra Government has had a well organised procurement

system. In their opinion too, the overall coordination between the various agencies has to be done at the district level by Zilla Parishads and the Department of Agriculture.

6.5 The Commission recommends that a multiplicity of agencies should be encouraged in the field of production and marketing of certified seed. There are five possibilities in this respect, viz., (i) seed corporations, (ii) seed cooperatives, (iii) seed growers organisations, (iv) agro-industries corporations and (v) private agencies. All of these should be used both for production as well as marketing. Agro-industries corporations should be ordinarily used for marketing purpose only, but these can be utilised to enter into production programmes as well, when governmental interests so necessitate. These agencies should give top priority to multiplication and distribution of quality seed of paddy and wheat. Overall coordination between the various agencies suggested should be that of the State Departments of Agriculture.

*Government Responsibility in Production and Assessment of Certified Seed*

6.6 The principle of multiplicity of agencies in the field of production and marketing of certified seed has already been suggested in paragraph 6.2. Broad principles of assessment of seed requirement as enunciated in paragraph 5.12 will apply for certified seed too. But in a planned economy, when States have to achieve certain targets of agricultural production, provision of right types of seed for various production programmes perforce becomes their direct responsibility. States cannot shirk responsibilities for ensuring production of seed and guaranteeing off-take. Because of insufficient publicity or some other obstacle, it is likely that a programme may not sometimes go through for the entire area planned. In such a case, if there is surplus of seed in any year, provision has to be made for storing seed in such a contingency under proper temperature and humidity conditions so that it remains viable and is not infested by pests in storage. Cost of this storage and interest charges on the hold-up stock constitute an extra expenditure that a State has to undergo for ensuring success of its programme. This much risk appears absolutely necessary. State Governments can undertake such responsibilities as described here either directly or through their Agro-Industries Corporations or through State sponsored seed corporations or even through cooperatives.

6.7 Recognising that agencies in the field of production and marketing of certified seed shall, in general terms, have their own

mechanism of assessment of seed requirement and subsequent production and marketing of seed, the Commission recommends that in so far as planned programmes are concerned, State Governments shall bear direct responsibility for ensuring that their programmes are fully backed by their own assessment and production of the required quantity of certified seed. In such cases they should undertake to ensure full off-take and ensure proper storage of carried-over stocks, if any. They are free to utilise any of their state sponsored organisations or corporations for this purpose to such an extent as they may deem fit.

### *Constraints on the Seed Industry*

6.8 One State Government has stated that the usual constraints in the production of certified seed are : lack of market assurance, non-availability of proper seed purchasing agency and paucity of credit facilities for production and bank advances on carryover seeds. All these, in short, mean that seed growers are ultimately afraid that production of seed would result in loss in the absence of an agency purchasing their seed. In another State the constraints are stated to be: high cost of production, non-availability of technical personnel in sufficient number, lack of proper processing facilities and non-availability of a regular and constant demand for improved seed. Some other points brought to the Commission's notice are briefly mentioned hereafter. There is unawareness on the part of cultivators in general about the importance of quality seed in agricultural production. Even workers engaged in agricultural research and extension programme are not fully aware of the importance of quality seed. There is no well-knit production and distribution agency for quality seed. Even though the Seeds Act has been passed, its implementation is very slow. Certified seed is very exorbitantly priced. In USA, by and large, the certified seed of self-pollinated crops is marketed at 50-60% above the price of market grain quality and the price of hybrid seeds is about 7-8 times that of grain. Lack of finance, inadequate storage and transport facilities have also affected seed programmes in some States. Among themselves, these are sufficient to illustrate the many hurdles that block the progress of a healthy seed industry in the country at present. However, most important of these which need immediate solution are: (i) cost of seed and (ii) credit. These are described below:

### *Cost of Seed*

6.9 The NSC states that a healthy seed industry is one in which the consumer can pay enough for seed for commercial

production to allow the producer a reasonable profit, the processor a reasonable return for his investment and the marketer a reasonable return on his time and effort. Wide fluctuations in pricing and provision of seed to the cultivator at high subsidised prices, except under emergencies, both tend to restrict growth of a strong industry. One view is that purchase prices to growers and sale prices to farmers should be left ordinarily to be regulated by market forces. Cooperatives and government undertakings as well as departments distributing seed should so fix the prices as to cover all their costs, overheads, risks and write-offs and provide a reasonable rate of return to the exchequer. No subsidies or guarantees would be necessary in these circumstances.

6.10 There is enough to suggest that cost of seed has perforce to be high. Yet, there are two ways in which it can be kept within reasonable limits. Firstly, a large and consistent demand should be created among cultivators for quality seed. It has to be inculcated into them that the cost which they pay for high quality seed is but small when compared with the profits which they can reap from the out-turn. They have also, side by side, to be educated by actual demonstrations as to how full benefits are assured by following the accompanying agronomic practices. By these two methods, once a taste has been created in farmers for the use of quality seed, they will never again prefer inferior seed and thus a surer market for high class seed would have been automatically created. In both these methods extension workers have to play a very significant and apt role. Almost all the replies are unanimous in this respect. Secondly, the risk of losses which the producers of certified seed face due to large carry-over of stock and write-off of non-viable or damaged material has to be minimised. In this connection, the TDC suggests that State Government should consider whether they can provide to agencies concerned interest charges at 9% and storage charges at 3% on the carried-over stock subject to a ceiling of 5% of the purchase price of the entire stock produced. Under this arrangement, a government is not required to purchase any seed or to bear any risk on account of unsold stock or spoilage, etc. nor is it required to undertake the responsibility for distribution of any seed through departmental channels and at the same time a dealer is assured to some reasonable extent of the coverage of his losses. The latter suggestion can help the dealer to a great extent in pricing his material moderately.

6.11 We recommend that Extension media—both central and state—should be fully utilised for educating farmers in the use of

quality seed. Demonstration programmes for the purpose of popularising seeds of high yielding varieties should be intensified so as to create growing market for quality seed and ensure reduction in the cost of seed.

6.12 We further recommend that the State Governments should give suitable financial concessions to concerned agencies dealing in certified seed against risks of large carry-over and write-offs of damaged seed. The suggestion of Tarai Development Corporation (Pantnagar, U.P.) is worth giving a trial. According to it, a Government is required to assist by providing interest charges at 9% and storage charges at 3% on the carried-over stock subject to a ceiling of 5% of the purchase price of the entire stock produced.

6.13 Credit is really the most serious constraint in the development of seed industry. There is need for long term credit to finance construction of processing plants, storage godowns and needed equipment. There is need for short-term credit to permit sound seed industries to finance annual operational costs. The Seed Review Team had assessed financial needs of seed growers, seed processors and marketing firms as well as financial needs of farmers who purchase the seed. The following recommendations are significant in this connection:

- (i) The Fertiliser Credit Committee had recommended the formation of a Fertiliser Credit Guarantee Corporation. Such a guarantee should also cover vital agricultural inputs like seed.
- (ii) The Reserve Bank should make it clear to commercial banks that all seeds—raw or processed, certified or non-certified, whether produced on contract with State Governments or otherwise—should be treated as agricultural inputs and not as grains for the purpose of granting advance.
- (iii) The working capital requirements of seed industry are of a high order and there are several practical and procedural difficulties. The Reserve Bank and the nationalised banks should pay special attention to ensure that seed enterprises get adequate and timely credit even if this means relaxation of their normal procedures regarding hypothecation of stocks, etc. Such liberalisation is necessary in view of the vital role which seed enterprises have to play in increasing agricultural production.

6.14 The Union Ministry of Agriculture states, that, at present, credit is available only at the production stage but not for processing, storing and marketing, etc. According to them, a dialogue with the Reserve Bank of India has already been going on. The Credit Guarantee Corporation has already been set up by the Government of India and it is being explored how best it could assist the seed industry in meeting its requirement of finance.

6.15 While noting with satisfaction that the Union Ministry of Agriculture is already taking action, we recommend that proper arrangements should be made for financing seed industry as expeditiously as possible.

#### *Watch over the Progress of Seed Production and Distribution*

6.16 A question was posed in the questionnaire whether there was any need for setting up seed development councils at the Centre and States for looking after the development of seed production and distribution. Most of the replies are not in favour of such councils and feel that the Central Seed Committee and its State Sub-Committees constituted under the Seeds Act should be sufficient to watch the progress and advise suitably the governments on the steps needed to augment or orient the development of seed production and distribution from time to time according to needs.

6.17 The Commission recommends that statutory committees set up under the provisions of Seeds Act at national and State levels should review and advise government on the steps needed to be taken from time to time to ensure quick and steady development of seed industry.

#### *Organisation of State Certification Agencies*

6.18 The Seeds Act requires that each state should set up its own certification agency. Till last year, however, the NSC itself was performing the role of certification agency, as a promotional measure, in all the states excepting Gujarat. Six states have now got their own certification agencies, but there does not seem to be any uniformity in staffing structure and standards of certification. The Union Ministry of Agriculture

therefore, convened an All-India Seminar on Seed Certification, which was held in December 1970. The Seminar recommended that independent certification agencies should be established in each state and that these agencies should be independent of production, marketing and seed law enforcement. There should be State Seed Certification Boards too to advise. Such boards should consist of representatives of the Departments of Agriculture, seed producers, traders and agricultural scientists (like breeders, agronomists and pathologists).

6.19 At the Central level, it was recommended that there should be a Central Seed Certification Board to advise and coordinate activities of the Seed Certification Boards of the States. It is gratifying to note that these recommendations of the Seminar have been accepted by the Government of India and have also already been commended to State Governments. It is also gratifying to note that the Union Ministry of Agriculture are proposing to formulate a centrally sponsored scheme for financially assisting the proposed certification agencies.

6.20 We recommend that there should be separate State agencies for official certification of seed, that Central and State Seed Certification Boards should be constituted and that action to extend financial assistance to certification agencies should be speeded up as much as possible.

## SECTION VII

### ACKNOWLEDGEMENTS

7.1 Thanks of the Commission are due to the institutions, organisations and individuals, who readily responded to the Questionnaire.

7.2 Dr. R.K. Misra, Specialist, personally analysed the replies to the Questionnaire on this subject and made valuable contribution to the preparation of this Report. Shri Sada Nand, Joint Director, Shri M.L. Manrai, Assistant Director and Shri S.P. Mathur, Research Investigator of the Research Division of the Commission, rendered valuable assistance.

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*Members Secretary*

New Delhi

25th November 1971



## APPENDIX I

### Questionnaire on Improved Seeds\*

Terms of Reference—

A(v)—(a)

#### I. Quality of Seed

(1) Complaints are received from time to time regarding the deterioration in the quality of seed distributed by the various Seed Agencies. Some agency at the field level has to be made responsible for looking into these complaints and locating the causes of deterioration. Which agency or combination of agencies in your opinion can perform this function at the field level ?

(2) It has been suggested that the Extension agency should exercise continuous vigilance and take necessary steps to get the problem of low yields in the case of high yielding varieties even when certified seed is used, analysed with the help of scientists and locate the causes. Do you agree with this view ? If so, what concrete steps do you suggest for organising this verification? The low yields may be due to the cultivators' not following the recommended agronomic practices or to the poor quality of seed.

(3) If it is established that the low yield is due to the poor quality of seed and not to the non-adoption of improved agricultural practices, what steps do you suggest to locate the lapse or lapses that might have occurred in production, processing, certification or distribution ? On which agency should the responsibility be placed for taking measures to remove the lacunae ?

#### II. Breeder's Seed

(4) It has been suggested that the responsibility of production and supply of required quantity of breeder's seed as indented by the organisation named to produce the foundation seed should be fixed on certain breeders and institutions by the research agency. Do you agree with this approach ? How long do you think will this take—can all the arrangements be completed by the beginning of the next season, *i.e.* June, 1972 ?

(5) It has also been suggested that the growers of foundation seed should indicate specifically the quantities of seed of different varieties required to the breeders directly, and that breeders entrusted with this responsibility should plan for the production of larger quantity than what is indented so that on no account there would be shortage of breeders' seed. What in your opinion should be the additional amount so planned to be produced to provide for fluctuations in weather ? Is 25% excess sufficient ?

(6) Another view is that there should be arrangements for storing certain quantities of breeder's seed from year to year so that the vagaries of

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\*This relates to high yielding varieties of cereal seeds only and also to certain more important aspects of multiplication and distribution of quality seeds.

weather conditions are taken care of. If arrangements for storage are made, is the need for producing larger quantities of breeder's seed than are required each year avoided? What should be the amount so stored? Who should store the breeder's seed the breeder or the grower of foundation seed? Can the storage facilities available with the foundation seed agency or any other agency be made use of on hire basis?

(7) Do you agree, as a policy, that the pricing for the supply of breeder's seed should be such as would enable the breeder's seed production to pay for itself?

(8) Do you agree that the production of breeder's seed should be treated as part of the basic research programme and all the facilities required should be provided as part of the "committed" research programme of the institution itself?

(9) What measures do you suggest for carrying out research on the procedure of production of breeder's seed and methods of seed production in general so that these are improved continuously. Which agency should be entrusted with coordinating functions in this regard? A suggestion is to give this function to the ICAR.

(10) What should be the arrangements for certifying breeder's seed? It has been suggested that the breeder should allow test-checking by other scientists to ensure proper quality. Another view is that the breeders themselves should carry out internal checks to ensure that the seed produced by them is true to type. Which view do you support? Why?

(11) Do you suggest that the field test should be conducted every year by the breeders to ensure that the material produced by him year after year is the same, or better than the original material?

(12) What role should the breeders play in seeing that the foundation seed and certified seed produced and distributed by various agencies are of the requisite quality? Should they go a step further and collect samples of foundation seed and certified seed and compare with the breeder's seed produced by them by actually growing the crop?

### III. Foundation Seed

(13) What is the role of the National Seeds Corporation in the matter of production of foundation seed? One view is that they should have virtual monopoly with regard to production of foundation seed and they should play a leading role in developing seed industry as a whole in the country. The other view is that the N.S.C. should have only a coordinating role. Other agencies, particularly the Agricultural Universities or seed growers or the other Research Institutes where new varieties are evolved, should be allowed to multiply the foundation seed. Yet another view is that the N.S.C., should have the monopoly in respect of seeds of all-India importance only while other agencies could be free to multiply foundation seeds of local importance. What is your view (a) with regard to arrangements for foundation seed, and (b) the role of the N.S.C. and other organisations in this matter?

(14) Where in addition to the N.S.C., foundation seed agency or agencies are to be set up in each State, which is the agency that should be set up for production and supply of foundation seed? What facilities do they require for this purpose? Is there any agency named as foundation seed agency

in your State ? If so, which agency ? If not named already, what steps are being taken to do so ?

(15) Who should assess the requirements of foundation seed of different varieties ? Should each foundation seed agency do it or should this responsibility be discharged by the State Governments ? What should be the role of the foundation seed agency with regard to leadership in building up appropriate certified seed producing and marketing agencies so that the foundation seed produced by them will be utilised in full ?

(16) What is the role of the Government of India and the State Governments in the matter of foundation seed agencies ? In what form should assistance be given to these agencies in producing and marketing the required quantities of foundation seed (and their assessment) ?

(17) How should breeder's seed and foundation seed be allocated to different agencies multiplying the foundation seed and certified seed respectively ? What should be the policy of allocation ? What are the steps needed to create an atmosphere conducive to the development of seed industry as a whole ?

(18) What procedure would you suggest for conducting internal checks and for certification to ensure production and supply of needed quantities of quality foundation seeds of different varieties ? Would you suggest inspection or control by an independent agency like the research institution/ State Government over the seed produced by foundation seed agencies ?

#### IV. Certified Seed

(19) What should be the arrangements for multiplication of improved certified seeds in the different States ? Five alternative agencies are possible, viz., (i) Seed Corporations (ii) Seed Co-operatives (iii) Seed Growers' organisations (iv) Agro-Industries Corporation, and (v) private farmers. Which of these organisations, in your opinion, are suitable for the production and marketing of certified seed ? Give your views separately for self-pollinated crops and hybrid varieties of crops. In particular, what arrangements will you recommend for paddy and wheat seeds ? Do you advocate a multiplicity of agencies in each State ? If so, how do you ensure coordination between them ? To whom would you entrust the responsibility for overall coordination and development ?

(20) Identify the constraints that are operating on the seed production and suggest a system under which appropriate policy and administrative action are taken quickly for the proper development of the seed industry.

(21) Is there any need for setting up a Seed Development Council at the Central and State levels for looking after the development of seed production and distribution ? Or will the Statutory Committees set up under the Seed Law at national level and State levels review and advise the governments on the steps needed to be taken from time to time ? What measures do you suggest in the field of training, setting up processing and storage facilities and for ensuring availability of credit ?

(22) What is the position regarding the setting up of Seed Certification and Inspection organisations envisaged under the Seed Law ? Where they have not yet been set up, will it be possible to set them up by December, 1971 at the latest ?

(23) What arrangements do you suggest for gearing up the Extension agencies to educate the farmers on the advantages of the use of certified seed and about the provisions that exist under the Seed Law to ensure supply of quality seed ?

(24) Do you agree that the demonstrations should be organised to impress on the farmers that the cost on seed is a small fraction of the total production cost, and that the money spent in purchasing certified seed is a wise investment ? At what level should these demonstrations be organised and by whom ?

(25) What should be the role of the Department of Agriculture in the Ministry of Agriculture at the national level and the State Departments of Agriculture with regard to planning and implementation and financing of suitable programmes of seed production and distribution in a coordinated manner ?

(26) Who should be responsible for assessing the requirements of seed at nucleus level, foundation level and the certified level ? Should each individual breeder/foundation seed grower/certified seed grower assess the requirements for himself or on the basis of the indents placed on him by the purchasers, or should an attempt be made to relate the seed requirements to the targets set and the responsibility for the production of required quantity of seed be allocated among the different agencies concerned ? Should the Government take up this responsibility for assessment of the seed requirements ? If so, does it automatically follow that the Government would also have to bear the losses, if any ? Is it possible always to meet the losses by suitable pricing policy ?

APPENDIX II

*List of addressees whose replies to the Questionnaire on Improved Seeds were received in time for consideration*

Name	Designation	Address
1. Shri S.M.H. Burney	Joint Secretary to the Government of India	Ministry of Agriculture, Krishi Bhavan, New Delhi-1.
2. Shri I.J. Naidu	Agricultural Census Commissioner and Ex-Officio Additional Secretary to the Government of India	Ministry of Agriculture, Krishi Bhavan, New Delhi-1.
3. Shri G.C.N. Chahal	Managing Director	National Seeds Corporation Ltd., F-44 A, South Extension-I, New Delhi-49.
4. Dr. R.L. Paliwal	Managing Director	Tarai Development Corporation Ltd., Pantnagar, P.O. Haldi, Distt. Nainital, Uttar Pradesh.
5. Shri O. Rahman	Managing Director	Assam Seeds Corporation Ltd., Chenikuthi, Gauhati-3, Assam.
6. Shri K. Madhava Sharma	Managing Director	The Tamil Nadu Agro-Industries Corporation Ltd., Industrial Estate, Guindy, Madras-32, Tamil Nadu.
7. Shri R.N. Prasad	Managing Director	Bihar State Agro-Industries Development Corporation Ltd., Boring Road, Patna-1, Bihar.
8. Shri M.R. Sivaraman	Managing Director	The Madhya Pradesh State Agro-Industries Development Corporation Ltd., New Market, Tatyatope Nagar, Bhopal, Madhya Pradesh.
<b>State Governments</b>		
9. Shri A.K. Sharma	Joint Director of Agriculture (I.P.)	Directorate of Agriculture, Government of Assam, Shillong, Assam.

Name	Designation	Address
10. By designation	Deputy Director of Agriculture	Directorate of Agriculture, Government of Nagaland, Kohima, Nagaland.
11. Shri M. D. Rapphap	Secretary (Agriculture)	Department of Agriculture, Government of Meghalaya, Shillong, Meghalaya.
12. Dr. K. Sengupta	Director of Agriculture	Directorate of Agriculture Government of West Bengal, Writers' Building, Calcutta-1, West Bengal.
13. Shri Saran Singh	Agricultural Production Commissioner	Government of Bihar, Patna, Bihar.
14. Shri Ram Krishan	Director of Agriculture	Directorate of Agriculture, Government of Uttar Pradesh, Krishi Bhavan, Lucknow, Uttar Pradesh.
15. Shri H.S. Mann	Director of Agriculture	Directorate of Agriculture, Government of Jammu & Kashmir Srinagar, Kashmir.
16. Shri J.L. Sarin	Deputy Secretary	Development (Agriculture) Deptt., Government of Punjab, Chandigarh.
17. Shri K.S. Bindra	Deputy Director of Agriculture (Cash Crops)	Directorate of Agriculture, Government of Haryana, Chandigarh.
18. Shri P.C. Sharma	Joint Secretary	Agriculture Department, Government of Himachal Pradesh, Simla, Himachal Pradesh.
19. Shri S.C. Verma	Production Commissioner	Government of Madhya Pradesh, Bhopal, Madhya Pradesh.
20. Shri R.P. Kapoor	Director of Agriculture	Directorate of Agriculture, Government of Madhya Pradesh, Bhopal, Madhya Pradesh.
21. Shri J.J. Mistry	Deputy Secretary	Agriculture, Forest and Cooperation Department, Government of Gujarat, Sachivalaya, Gandhi Nagar, Gujarat.

Name	Designation	Address
22. Shri S.E. Sukthankar	Secretary (Agriculture)	Agriculture and Cooperation Department, Government of Maharashtra, Sachiva- laya-Annexe, Bombay-32, Maharashtra.
23. Shri P.V. Ratnam	Joint Secretary	Food & Agriculture De- partment, Govt. of Andhra Pradesh, Hyderabad, Andhra Pradesh.
24. Dr. Md. Quadirudin Khan	Director of Agricul- ture	Directorate of Agriculture, Government of Andhra Pradesh, Hyderabad, Andhra Pradesh.
25. Dr. H.L. Kulkarny	Director of Agricul- ture	Directorate of Agriculture, Government of Mysore, Seshadri Road, Bang- alore-1, Mysore.
26. Shri M. Honnagaugue Gowda	Under Secretary	Agriculture and Forest Department, Government of Mysore, Mysore Govern- ment Secretariat, Vidhan Soudha, Bangalore, Mysore.
27. Shri A.J. Chacko	Director of Agri- culture	Directorate of Agriculture, Government of Kerala, Trivandrum, Kerala.
<b>Agricultural Universities</b>		
28. Dr. B. Samantra	Vice-Chancellor	Orissa University of Agri- culture and Technology, Bhubaneshwar, Orissa.
29. Shri S.K. Chakrabartty	Vice-Chancellor	Rajendra Agricultural University, Patna, Bihar.
30. Dr. M.S. Randhawa	Vice-Chancellor	Punjab Agricultural Uni- versity, 216, Sector 9-C, Chandigarh.
31. Shri A.L. Fletcher	Vice-Chancellor	Haryana Agricultural University, Hissar, Haryana.
32. Dr. L.S. Negi	Vice-Chancellor	Jawaharlal Nehru Krish Vishwa Vidyalaya, Krishni- nagar, Jabalpure-6, Madhya Pradesh.

Name	Designation	Address
33. Shri L.N. Bongirwar	Vice-Chancellor	Punjabrao Krishi Vidya-peth, P.O. Krishi Nagar Distt. Akola, Maharashtra
34. Dr. T.V. Reddy	Director of Research	Andhra Pradesh Agricultural University, J-Block, Agricultural College, Rajendranagar, Hyderabad-30, Andhra Pradesh.
35. Dr. K.C. Naik	Vice-Chancellor	University of Agricultural Sciences, Post Bag No. 391, XI Main, 16th Cross, Malleswaram, Bangalore-3, Mysore.
<b>Research Institute and Colleges</b>		
36. Dr. S.Y. Padmanabhan	Director	Central Rice Research Institute, Cuttack-6, Orissa.
37. Dr. S. B. Bandyopadhyay	Director	Jute Technological Research Laboratories, 12, Regent Park, Calcutta-40, West Bengal.
38. Dr. V. Sundaram	Director	Cotton Technological Research Laboratory, Adenwala Road, Matunga, Bombay-19, DD, Maharashtra.
39. Shri N.C. Gopalchari	Director	Central Tobacco Research Institute, Rajamundry-1 Andhra Pradesh.
40. Shri A.K. Ghosh	Head Agronomy Department	Allahabad Agricultural Institute, Allahabad-7, Uttar Pradesh.
41. Prof. S.M. Alam	Principal	Ranchi Agriculture College Kanke, Ranchi-6, Bihar.
42. Dr. R.M. Singh	Associate Dean	S.K.N. College of Agriculture, Jobner, Distt. Jaipur, Rajasthan.
43. Shri Dattatray Vable	Principal	Dayanand College, Ajmer, Rajasthan.
44. Shri M.P. Singh	Associate Dean	College of Agriculture, Indore, Madhya Pradesh.



Name	Designation	Address
45. Dr. R.M. Patel	Director	Institute of Agriculture, Anand (Western Railway), Gujarat.
46. Shri D.D. Gopani	Principal	N.M. College of Agriculture, Navsari, Gujarat.
47. Shri H.B. Ulemale	Principal	Shri Shivaji Agriculture College, Amravati, Shivaji Nagar, Morshi Road, Amravati, Maharashtra.
48. Dr. G.P. Argikar	Associate Dean	College of Agriculture, Kolhapur, Maharashtra.
49. Dr. S.K. Dorage	Associate Dean	College of Agriculture, Depoli, Dist. Ratnagiri, Maharashtra.
50. Dr. Hussain Ali Razvi	Principal and Dean	College of Agriculture, A.P. Agricultural University, Rajendranagar, Hyderabad-30, Andhra Pradesh.
51. Dr. A. Adlvi Reddy	Principal	Agricultural College, Bapatla, Guntur District, Andhra Pradesh.
52. Shri G.H. Sonkara Reddy	Principal	S.V. Agricultural College, Tirupati (P.O.), Chittoore Dist., Andhra Pradesh.
53. Dr. C.V. Govindaswamy	Dean	Madurai Agricultural College, P.O. Madurai, Tamil Nadu.