Chapter I

INTRODUCTION

Agriculture is the backbone of Indian economy contributing nearly 45 per cent to the Gross National Production. It supports over 70 per cent of the population and constantly helps in capital formation in the manufacturing sector. Farmers in India know the value of good seed and have been doing their best in their own way in cleaning, preserving and using good seed out of their produce. But the methods known and practiced are no longer adequate to meet the needs of the modern farming.

The role of quality seeds in increasing agricultural production has been well established in India since the advent of high yielding varieties (HYV) and hybrids in food crops. The introduction of HYV programme in the country was made to realise the need for a modern seed processing industry. This prompted the government of India to formulate many schemes and regulations for the production and processing of quality seeds and making them available to the farmers as a major plank in stepping up agricultural production in the country. As a result, the food grain production has increased from 60 million tonnes in 1950-51 to 151.5 million tonnes in 1983-84. Yet, there is a constant need to achieve an annual growth rate of four per cent to keep pace with the consumption levels in the country and to reduce imports. The increased use of quality seeds of improved varieties is therefore recognised as an essential input to the continued development of Indian agriculture.

Green revolution, with its sudden spurt in the demand for new variety seeds from all over the country, gave a fillip to the seed processing industry, attracting more people from different sectors to invest in the seed business. Many agencies and farmers have become seed producers and processors using the local knowledge and experience in the field. As a result, the seed industry has grown at an unusual pace and is continuing at fluctuating rates in some parts of the country which is true in state of Karnataka also.

Development and production of improved seed have little effect on agricultural productivity, unless and until pure and viable seeds of such varieties are made available to the farmers at right time and place in adequate quantities and at reasonable price. The role of seed processing industry assumes special significance to accomplish a dependable supply of quality seeds in pace with the seed demand and diversification of crop production to satisfy 70 million (m) farmers in 50 thousand villages, located in far flung areas of the country. It is possible to make them available only through efficient planning and management of modern seed processing industry in strategic locations.

Seed processing is a major segment of seed industry responsible for preparing harvested seed for marketing. It works as a vital link between the seed producers and consumers.

Modern seed processing is of recent origin in the country which involves high degree of mechanization, engineering skill and modern management techniques. It calls for efficient post harvest operations to maintain the quality of the processed seed within the prescribed quality standards. The major steps in seed processing are transportation, pre-conditioning, drying, cleaning and grading, treating, packaging, storage and handling. This post harvest-engineering aspect of seed industry has not received due consideration and much remains to be done in efficient organisation and management of seed processing industry to the best advantage of the farmers. Inspite of this awareness, the state of affairs in regard to seed processing, storage and distribution in many of the states has been reported to be disheartening (Arakeri 1975).

Seed Review Team (1968) appointed by the Government of India submitted a comprehensive report containing 101 recommendations on a wide range of topics including seed processing, storage, transportation, marketing and management practices to develop sound seed industry in the country. Though the recommendations have been accepted, most of them are still to be implemented.

The estimated quantity of seeds used annually by the Indian farmers for 12 major crops is nearly 40 million quintal (m qtl), worth Rs 600 crores calculated at $1\frac{1}{2}$ times the lowest grain price. Out of the total cultivated area of 140 m ha in the

country, the area under HYV coverage was 9.2 m ha in 1968-69, 15 m ha in 1970-71, 30 m ha in 1975-76 and 40 m ha in 1980. The estimate of certified seed production in the country is 4.2 m qtl in 1983-84 and 22.2 m qtl in 1989-90 with a proposal to set up about 2000 seed processing plants during this period (Anon, 1983). The total number of seed processing plants reported at present are about 500 in various parts of the country as against the recommended 3100 (National Commission on Agriculture, 1976) of 10,000 qtl capacity each in 2000 A.D. Hence establishment and development of strong and viable seed industry in the country is a great challenge to the agricultural engineers, scientists, planners and administrators.

The problems experienced by the seed industry elsewhere in the country are also true for the State of Karnataka, nay they are of different nature and magnitude. The state has well organized infrastructure, technical knowhow, irrigation facilities, rich and varied agro-climatic conditions favourable for quality seed production of various crops, all through the year. This basic infrastructure and potentials made the state a pioneer in setting up seed processing industry on a large scale. Besides, the advent of second national seed project with the financial assistance of the world bank has generated more scope for improvement of the seed processing industry.

The projected seed requirement to cover about 4.3 m ha of area under five principal cereal crops in the state would be 3,87,500 qtl as against the present production of 87,000 qtl. which is only 22.45 per cent of the requirement. In 1977, there were 75 seed processing plants in the state, of which 58 were in private sector. Out of 75 plants, 53 were concentrated in compact seed zones of Bangalore and Kolar districts, managed by Government, Cooperative and Private Agencies and the rest were scattered in other 17 districts.

The growth of entire seed industry depends upon rapid but carefully planned approach to its development and solutions of the problem. The accelerated growth of seed processing industry in some selected seed zones of Karnataka has created many new problems for the management to balance the various segments of seed industry and to improve the cost and performance of the existing system. Hence, there has been a set back both in quality and quantity of seed processed. As a result, many of the plants have gone sick and the number of working plants in the state have been reduced from 75 in 1977 to 40 in 1981, of which 24 plants are in Kolar and Bangalore districts including six sick plants. The existing capacity of these 40 seed processing plants is sufficient to meet the present demand provided they are relocated and efficiently utilized. At present, most of these plants work below 20 per cent of their installed capacity. Many of the plants are not fully equipped with the

required machinery, drying and storage facilities and are afflicted by poor management and as such their performance is poor. The selection of optimum size, number and location of seed processing plants and their costs and performance are not given due consideration while planning and execution.

Looking to the problems faced by the seed industry, the Government of Karnataka requested the University of Agricultural Sciences, Bangalore in 1973 to review the state seed programme and suggest a detailed plan of action to improve the seed production, processing, storage and distribution in the state. A comprehensive report with spelt out responsibilities and lapses of different agencies involved in seed industry was submitted in 1974. Subsequently, a State Technical Committee(1978) was constituted to review the performance of seed processing plants and identify the technological setbacks. Some of these problems have been pointed out (Garbe, 1979) time and again, but so far no systematic attempt has been made to analyse and develop methods to evaluate and improve the existing seed processing industry. This aspect requires a thorough scientific analysis to develop guidelines for establishing the processing plants in future and also to optimize the existing seed processing industry to the best advantage of the farmers and the state.

The past literature revealed that there is no sufficient published information on the comprehensive study on the performance and optimization of seed processing industry, though

considerable work is reported on the plant location problems relating to other commodities.

Basically the processing plant location problem is the determination of number, size and location which minimizes the total system cost with certain constraints in a defined region using the new techniques of operations research and systems engineering to analyse the problem systematically. The system costs include transportation, fixed, variable and storage costs.

Taking into consideration, the importance and problems of seed processing industry in the potential seed zones of Karnataka, it was proposed to carryout the research work in Bangalore and Kolar districts with the following specific objectives.

1. To study the characteristic features of the seed processing industry;

2. To study the performance and evaluation of existing seed processing and storage plants;

3. To conduct storage studies for various kinds of seeds under different ambient and accelerated ageing conditions and to develop their viability equations.

4. To evaluate different and total costs incurred in the existing plant location-allocation system;

5. To formulate and simplify the general mathematical model for the plant location-allocation problem and adapt suitable solution procedures;

6. Application of the simplified models for selecting optimum number, size and location of seed processing plants in the defined region;

7. To suggest the most suitable plant locations for the present, targetted and potential seed production volumes of the region;

8. To compare the costs incurred under existing and proposed plant location systems.

In short, there is enough technical information available on production, processing, testing, treating and storage of seeds. However, very little is known about the planning and management of seed processing industry under Indian conditions. Hence, it was thought that the present study may be useful to the process engineers, administrators and other management personnel in successful implementation of the different planned objectives of seed processing industry in future and to improve the performance of the existing seed processing and storage systems.