Seed Production
Technology of Vegetables
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Vegetables play the vital role in the nutritional security of the Indian populace and economy of the majority of small and marginal farmers. For success in vegetable growing enterprise, high quality seed is not only highly desirable but also a statutory requirement. To meet the requirement of the farmers for seed of good quality and genetic purity, it should be produced by using the standard agrotechniques under strict seed certification standards.

This book is intended as a reference for all concerned with the basic vegetable seed production technology—land requirements, field inspection, field and seed standards, brief cultural practices and important Varieties/Hybrids characteristics.

The book Seed Production Technology of Vegetables may be of great utility and intend to be a better guide to the students, teachers, research scientist, extension worker, policy makers, various seed companies, vegetable seeds producers and farming community as a whole who directly and indirectly are engaged in the production of quality seeds.

Our sincere thanks are due to our colleagues for the help rendered in various ways in the completion of this book.
Though every effort has been made to ensure the authenticity of the content of the book. The views and facts presented are solely those of the authors of various books journals consulted. The authors do not take any responsibility of the correctness, authenticity or views of the previous authors.

Prabhakar Singh
B.S. Asati
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Family—Solanaceae

1. Brinjal
2. Tomato
3. Chilli and Bell Pepper
4. Potato
Family–Malvaceae
5. Okra
Family–Cruciferae
6. Radish
7. Cauliflower
8. Cabbage
9. Turnip
Family–Alliaceae
10. Onion
Family–Leguminosae
11. Pea
12. Fenugreek
13. French bean
14. Cowpea
Family–Chenopodiaceae
15. Spinach Beet (Palak)
Family–Umbelliferae
16. Coriander
17. Carrot
Family–Cucurbitaceae
18. Cucumber
19. Muskmelon
20. Watermelon
21. Bitter Gourd
Family–Compositae
22. Lettuce
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Chapter 1

Introduction

Vegetables play a vital role in the health and nutritional security of human beings in addition to improve the economy of the people of the country. India is next only to China in area and production of vegetables and occupies prime position in the production of cauliflower, second in onions and third in cabbage in the world. The total production of vegetables has been estimated at 108.20 million tonnes from an area of 7.05 million hectares and average productivity of 15.34 tonnes per hectare during 2005-06 (NHB, 2006).

Seed production in vegetables is the limiting factor for cultivation of vegetables in India. The vegetables require specific temperature and other climatic conditions for flowering and fruit setting. Some vegetables are grown in one part of the country but their seed production is restricted to another part. To reduce such microclimatic condition a protected environment is essential. Summer squash requires a mild climate for flowering, fruit setting and fruit development, and seed formation. Therefore, its seed production is only restricted to hilly region of north India in summer season. But nowadays seed production of summer squash ‘Australian Green’ and ‘Pusa Alankar’ is also feasible in north Indian plains in a low-and medium-cost greenhouse. Similarly, seed
production of highly remunerative crops—tomato, capsicum and cucumber—is also performed under protected environment. The maintenance of purity of different varieties/lines can be achieved by growing them under greenhouse without giving isolation distance particularly in cross-pollinated vegetables—onion, cauliflower and cabbage. To get proper pollination and fruit set in onion, summer squash, cucumber and bittergourd, the bee-hives are kept inside during flowering. Vegetable production of our country is still dominated by the locally available genotypes or open pollinated varieties. This is mainly due to farmer’s ignorance and poor extension activities. Although, it is possible to produce vegetables in one or the other parts round the year due to ports being near and also good infrastructural facilities created, the production is presently limited in certain pockets for meeting the demands of the foreign markets.

**Table 1: Area of Production of Important Crops**

<table>
<thead>
<tr>
<th>Crop</th>
<th>Area of Production</th>
</tr>
</thead>
<tbody>
<tr>
<td>Okra</td>
<td>Nasik, Ozar, Saikheda, Dindhori, Kolhar, Naraingaon and Sholapur in Maharashtra.</td>
</tr>
<tr>
<td>Chilli</td>
<td>Pen, Alibaugh and Choul in Raigad district Dindhori, and Niphad and Itgatpuri Taluka in Nasik district of Maharashtra.</td>
</tr>
<tr>
<td>Watermelon</td>
<td>Panvel near Mumbai and Maharashtra state.</td>
</tr>
<tr>
<td>Bottle gourd and bitter gourd</td>
<td>Nasik and Pune district in Maharashtra.</td>
</tr>
<tr>
<td>Capsicum</td>
<td>Nasik, Pune and Satara district in Maharashtra.</td>
</tr>
<tr>
<td>French bean and cluster bean</td>
<td>Dindhori in Nasik district, Wai in Satara district and Naraingaon in Pune, Dhule and Ahmednagar.</td>
</tr>
<tr>
<td>Onion (big)</td>
<td>Nasik, Pune and Satara district in Maharashtra, Periyar and Coimbatore district in Tamil Nadu, Bhudaun in Uttar Pradesh and Patna, Biharsharif in Bihar, Bhavnagar and Rajkote in Gujarat.</td>
</tr>
<tr>
<td>Onion (small)</td>
<td>Kolar and Bangalore in Karnataka and Cuddapah in Andhra Pradesh.</td>
</tr>
<tr>
<td>Onion (multiplier)</td>
<td>Anna, Madurai, Salem and Coimbatore district of Tamil Nadu.</td>
</tr>
<tr>
<td>Garlic</td>
<td>Indore and Mandsaur in Madhya Pradesh, Ooty in Tamil Nadu, Jamnagar and Rajkot in Gujarat and Kullu in Himachal Pradesh.</td>
</tr>
<tr>
<td>Tomato</td>
<td>Nasik and Pune in Maharashtra and Bangalore in Karnataka.</td>
</tr>
<tr>
<td>Potato</td>
<td>Jallandher and Ludhiana in Punjab, Kurukshtreta and Karnal in Haryana, Ooty in Tamil Nadu and Indore in Madhya Pradesh.</td>
</tr>
</tbody>
</table>
Need for Quality Seed Production

A statement “Good seed on good land yields abundant produce”—appearing in the ancient Hindu scriptures, the Manu Smriti provides an age-old recognition to the good quality seed in crop production. The use of good quality seed is indispensable for the successful production of any crop. The cost of seed is small fraction of the total cost of inputs involved in raising the crop to maturity. A good quality seed is good looking, viable and vigorous, genetically pure (true to type), bold and uniform size of the desired type, free from disease, insects-pest, weeds seeds, foreign matter which may impair the quality of seed, fairly priced, better longevity, good yielding ability and have wider adaptability. Quality seed production is a highly specialized activity and vegetable produce retained for seed can not be substituted for quality seed as it generally lack genetic vigour and has poor germination. The vegetable seed production comprising of complex interlocking operations that are necessary to ensure the regular supply of uniformity high quality seed to farmers. However, the quality seed production is only possible by maintaining proper isolation distance, timely removal of off types, volunteer plants and wild relatives is also important.

Seed Import and Export

The biggest seed trader (import + export) is Japan with 80 million $, followed by Korea with 23 million $, and Thailand 20 million $. China, and India seed sector are in full growth, and their export capabilities will presumably increase. All other countries are importing vegetable seeds only. It has been observed that even countries with a very strong vegetable seed industry, have high volumes of import, of which the value is compensated by the value of export. The high imports include seed for domestic market which is produced abroad, because, either for economic, or climatic reasons, the production is not possible locally. This practice of custom seed production abroad has become very common for developed seed companies. A lot of developing countries are concerned about their dependency on foreign seeds, and the loss in their trade balance. Some had even taken measures to restrict import of seed. The fact is that some countries with tropical climate will always need to import seed of certain crops such as cabbage and cauliflower for which seed cannot be produced locally. Moreover, countries like India, which has restricted import of seed for a long time, and revised the