CHAPTER 3

About the crop-potato
This chapter briefly highlights the origin and history of potato and the cultivation practices of potato in Uttarakhand. The chapter has been organised into two sections. Section 3.1 deals with the origin and history of the potato while section 3.2 deals with the cultivation practices of the crop in the state of Uttarakhand.

3.1 Origin and History

Based on various considerations about genetic diversity, Hawkes (1990) concluded that potato might have been domesticated in what is now the lake Titicaca of Peru to North Bolivia and might have originated from wild diploid species Solanum leptophyes some 7,000-10,000 years ago, and the first domesticated species was S. stenotomum. The secondary center of origin is believed to be Chile. According to the hypothesis of Vavilov (1951), these regions were the centers of origin of potato.

S. tuberosum is the most important cultivated potato. Some authorities believe that S. tuberosum is a straight tetraploid of S. stenotomum but there are stronger evidences in support of allotetraploid origin of S. tuberosum by hybridization between S. stenotomum and S. sparsipilum.

Formerly, potato was considered to be a crop adopted primarily to temperate conditions. However, during the last century or so, potato crop definitely made its presence felt in the sub-tropics. It is certainly of New World
Origin, having been brought to Europe in the late 16th or early 17th Century, some year after the discovery of America and Conquest of Peru. Potato has commonly grown in Spain and Italy by the late 16th century. It was widely grown in France by the mid of 17th Century. By mid 18th Century, it was taken to Norway and then to Sweden and Denmark from Scotland. From Europe, the potato spread to the rest part of the world. Either the Portuguese or the Britishers introduced it in India perhaps in late 16th or early 17th Century. The first record of the potato in India occurs in Terry's account of a banquet at Ajmer, given by Mr. Asaf Jaan to Sir Tomas Roo, the first British Ambassador to the court of Emperor Jahangir in 1615. It seems to have established itself in Surat (Gujarat) and Karnataka by 1875. Since then very little is known of the rest 150 years. However, by the beginning of the 19th Century the potato was accepted as an important vegetable crop. Major Young introduced potato in the hilly areas of Dehradun and Captain Mundi mentioned that cultivation of potato in Shimla hills was started in 1828. Potato cultivation had become well established by 1939 as source of income for the people of North Western hills (Nagaich, 1977).

Organized research was started in the first quarter of the 19th century, work on scientific lines was started in Bombay and Madras Presidencies. Trials on potato were started in Ootacamund in 1848. Feasibility of using cut potato seed was demonstrated in 1914 in Assam. In Bengal, work at Darjeeling was initiated in 1878-79 where research on varietal trials, manures and fertilizers, seed production, storage and cropping system was undertaken. In the undivided Punjab, work on potato was carried out mainly in
Shimla hills and Syalpur, Sialkot and subsequently at Kangra, Kuller, Palampur and Murrie hills. United Province, now known as Uttar Pradesh started work on varietal trials between 1882-1946 at Saharanpur, Lucknow, Chaubatia, Kanpur, Mussoorie, Nainital and Farrukhabad. Starting from 1958 to date a total of 35 high yielding varieties have been released for different agro-climatic situations in the country (Shekhawat et al., 1992 and Phadtrase et al., 2000). Not all varieties are presently under cultivation as new varieties have been replacing the old ones from time to time. As on date, 11 varieties are in the national seed production programme. These occupy nearly 95 per cent of the potato growing area in the country. Another five varieties which are relatively recent release, are accepted to gradually replace some of the varieties presently in the seed programme. A brief description of all these 16 varieties including maturity period, recommended regions and yield potential is presented in the following Table 3.1.

3.2 Cultivation practices

Now a brief outline of the cultivation practices in Uttarakhand is sketched. The knowledge is necessary as the study pertains to the commodity system approach of the crop. Moreover, it helped a lot while interviewing the farmers. Following statements will cover all the cultural practices (Tripathi and Srivastava, 2002)
3.2.1 Varieties

Different varieties have been recommended in the state according to the height above sea level as follows.

♦ Irrigated valley: Kufri Jyoti, Kufri Asoka, Kufri Anand
♦ Mid to high hills: Kufri Giriraj, Kufri Sheetman
♦ Tarai and Bhabar: Kufri Jyoti, Kufri Asoka, Kufri Jawahar and Kufri Bahar

3.2.2 Time of Sowing

♦ Tarai and Bhabar: Second fortnight of October
♦ Hilly area
  Irrigated 3000 ft: mid September to mid October
  Irrigated 5000 ft: January/February
♦ Non irrigated conditions, high hills, northern slope 7000 ft: March/April.

3.2.3 Quantity of seed

25-30 quintals per hectare (50 nali) seed is recommended. The seed weighing 25-30 gm should be used after treating with 0.5 per cent Borax solution.

3.2.4 Use of Fertilizer

Table 3.2 shows the recommended dose of fertilizer for potato crop in different regions.
Table 3.2: Recommended dose of fertilizer for potato in different regions.

<table>
<thead>
<tr>
<th>Constituent</th>
<th>Hills (irrigated)</th>
<th>Hills (Non irrigated)</th>
<th>Tarai and Bhabar</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nitrogen (kg/ha)</td>
<td>120</td>
<td>100</td>
<td>150</td>
</tr>
<tr>
<td>Phosphorus (kg/ha)</td>
<td>100</td>
<td>80</td>
<td>100</td>
</tr>
<tr>
<td>Potassium (kg/ha)</td>
<td>100</td>
<td>80</td>
<td>100</td>
</tr>
</tbody>
</table>

Source: Tripathi and Srivastava, 2002

Whole manure, half nitrogen and whole phosphorus and potassium should be mixed and applied at the time of last ploughing. Remaining nitrogen should be given after 30-35 days of sowing.

3.2.5 Irrigation and weed control

Field should be irrigated on time in the areas where water is available. Earthing should be done on the plant. Mulching can be done in the hilly areas for moisture conservation. This practice is more essential for unirrigated field and helps in increasing production.

3.2.6 Insect control

Epilacna, a common insect of potato, can be controlled by using 0.2 per cent carbaryl. Biting insect can be controlled by 0.2 per cent chlorophyriphos.
3.2.7 Disease control

♦ **Early and late blight**: 0.2 per cent Dithane M-45 should be applied on 40-45 days crop. Even after this, if the disease breaks, the mixture should be sprayed 3-4 times at the interval of 15 days. 0.2 per cent of Rhidomil can also be used.

♦ **Scab**: Sowing should be done after dipping the seed for 15 minutes in 0.3 per cent Borax solution.

3.2.8 Integrated Pest management (IPM)

Following are the various IPM practices that should be practiced in the crop

♦ Use certified seed (tuber)

♦ Treat the tuber with pseudomonas carbendazin (5 gm 1 gm) before sowing.

♦ Spray with Matribuzin (1 kg active ingredient per ha) just after sowing.

♦ Spray with Rhidomil MZ 72 (0.25 per cent) at the interval of 20 days on the occurrence of blight.

♦ Spray with pseudomonas (5 gm per litre water) on the standing crop of 60 days.

♦ Treat the tubers with 0.3 per cent boric acid after harvesting.

3.2.9 Yield

**Hill region:** Irrigated condition: 200-250 qtl/ha

Unirrigated condition: 150-200 qtl/ha

**Tarai and Bhabar region:** 300-350 qtl/ha
3.2.10 Precautionary notes

- Certified and disease free tubers should be used.
- Treated seed (tuber) should be used.
- Tuber should be 25-30 gm and with 2 eyes.
- The crop should be saved from early and late blight.
- The recommended variety for the area should be chosen.
<table>
<thead>
<tr>
<th>Varieties</th>
<th>Maturity (days)</th>
<th>Recommended for</th>
<th>Yield potential (t/ha)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kufri Anand</td>
<td>100-110</td>
<td>U.P. plains and neighbouring states</td>
<td>35-40</td>
</tr>
<tr>
<td>Kufri Asoka</td>
<td>70-80</td>
<td>Bihar, Haryana, Punjab, U.P., West Bengal</td>
<td>40</td>
</tr>
<tr>
<td>Kufri Badshah</td>
<td>100-110</td>
<td>Gujarat, Haryana, J&amp;K, M.P., Punjab, U.P.</td>
<td>50</td>
</tr>
<tr>
<td>Kufri Bahar</td>
<td>100-110</td>
<td>Haryana, J&amp;K, H.P., U.P.</td>
<td>45</td>
</tr>
<tr>
<td>Kufri Chandramukhi</td>
<td>80-90</td>
<td>Bihar, Gujarat, Haryana, Parts of H.P., Karnataka, U.P., M.P., Maharashtra, Orissa, Punjab and West Bengal</td>
<td>25</td>
</tr>
<tr>
<td>Kufri Chipsona 1</td>
<td>90-110</td>
<td>Bihar and U.P.</td>
<td>40</td>
</tr>
<tr>
<td>Kufri Chipsona 2</td>
<td>90-110</td>
<td>Bihar and U.P.</td>
<td>35</td>
</tr>
<tr>
<td>Kufri Giriraj</td>
<td>130-135</td>
<td>North and South Indian hills</td>
<td>25</td>
</tr>
<tr>
<td>Kufri Jawahar</td>
<td>80-90</td>
<td>Haryana, Punjab, Gujarat, Karnataka, M.P.</td>
<td>40</td>
</tr>
<tr>
<td>Kufri Jyoti</td>
<td>110-130</td>
<td>N &amp; SI hills, Gujarat, Karnataka, M.P., Maharashtra, Punjab, U.P. and West Bengal</td>
<td>20</td>
</tr>
<tr>
<td>Kufri Lalima</td>
<td>100-110</td>
<td>Parts of Bihar, U.P.</td>
<td>40</td>
</tr>
<tr>
<td>Kufri Lauvkar</td>
<td>75-80</td>
<td>Plateau of Karnataka, M.P. and Maharashtra</td>
<td>30</td>
</tr>
<tr>
<td>Kufri Pukhraj</td>
<td>70-90</td>
<td>Bihar, Gujarat, Haryana, H.P., Karnataka, M.P., Maharashtra, Orissa, Punjab, U.P. and West Bengal</td>
<td>40</td>
</tr>
<tr>
<td>Kufri Sindhuri</td>
<td>110-120</td>
<td>Bihar, Gujarat, M.P., Punjab and U.P.</td>
<td>40</td>
</tr>
<tr>
<td>Kufri Sutlaj</td>
<td>90-100</td>
<td>Bihar, Haryana, M.P., Punjab, and U.P.</td>
<td>40</td>
</tr>
<tr>
<td>Kufri Swarna</td>
<td>130-135</td>
<td>South Indian Hills</td>
<td>48</td>
</tr>
</tbody>
</table>

Source: Pandey, 2002