INTRODUCTION

The main potato crop in north-western plains of India is harvested in February/March when the temperatures start rising. During this period, the potato prices are at their lowest. The farmers, therefore, tend to retain the produce till May when the prices start shooting up. Since the storage of potatoes at ambient room temperature during hot summer months results in severe weight and quality loss, a large part of the produce is shifted to cold stores immediately after harvest and released for sale from May onwards. The cold stored potatoes (usually stored at 2-3°C) are, however, not fit for processing as there is a sharp increase in their reducing sugars content at low temperatures, resulting in dark brown coloured processed products. The on-farm stored potatoes are known to maintain good processing quality. It would be advantageous to farmers and processors if after harvest the processing potatoes could be retained on-farm for an extended period of time without severe loss of weight and quality. The extent of weight loss during storage depends largely on the genotype. Efforts were, therefore, made to identify processing potato cultivars that would keep well at ambient room temperatures for about 2-3 months after harvest of the autumn and spring potato crops.

MATERIALS AND METHODS

Three Indian processing potato cultivars, viz. Kufri Chipsona-1, Kufri Chipsona-2 and Kufri Jyoti; two exotic processing cultivars, viz. Atlantic and Frito Lay-1533 and the best high yielding (non-processing) cultivar of the region Kufri Pukhraj were grown during autumn 2001-2002 and 2002-2003, and spring 2002 and 2003 crop seasons at the experimental farm of the Central Potato Research Station, Jalandhar. The autumn crop was planted in the second week of October, whereas, the spring crop was planted in the second week of January in both the years. Recommended cultural practices were followed. The crops were dehaulled at 90 days after planting and harvested after another 15 days to allow time for tuber skin curing.

The storage experiment with the autumn crop harvest was conducted from third week of March and with the spring crop harvest from third week of April in both the years. Five kilogram clean and uniform size tubers of each of the six cultivars were packed.

ABSTRACT: Autumn and spring crop harvests of 6 potato cultivars were evaluated for storability at room temperature during March to June 2002 and 2003, and April to July 2002 and 2003, respectively. Minimum total weight loss at 90 days of storage was observed in processing cultivar Kufri Chipsona-1 in both autumn and spring crop harvests. The cv. Kufri Jyoti from spring harvest also showed good keeping quality up to 90 days of storage. Exotic processing cultivars Atlantic and Frito Lay-1533 showed poor keeping quality.
individually in hessian cloth bags. This formed one replication. Three such replications were kept at room temperature. The number of tubers in each bag was recorded at the beginning of the experiment. Besides, five randomly selected tubers in each bag were individually marked and numbered. The initial weight of each marked tuber was recorded. These marked tubers were again weighed at the end of the experiment to determine physiological weight loss. The bags containing tuber material were stored for 90 days in ordinary room in dark allowing sufficient space for air movement between bags. The maximum and minimum temperatures and relative humidity were recorded every day. Per cent sprouting of tubers (as calculated from tubers having one or more sprouts above 2 mm long), and number and weight of healthy and rotted tubers were recorded at 30-day interval. Data on weight of sprouts were recorded at the end of the experiment. The data were pooled over years and statistically analysed (3). Per cent data were transformed to arcsine values before being used in analysis.

RESULTS AND DISCUSSION

The maximum and minimum temperatures and maximum and minimum relative humidity during storage period of the autumn crop harvest ranged between 28-45°C, 16-31°C, 36-82% and 11-65%, respectively. During storage period of the spring crop harvest, the maximum temperature varied from 26-45°C, minimum temperature from 15-31°C, maximum relative humidity from 47-77% and minimum humidity from 11-77%.

Storage behaviour of autumn crop:

The data on sprouting, rottage and weight loss are presented in Table 1. At 30 days of storage, the non-processing cultivar Kufri Pukhraj showed significantly less sprouting (72.1%) than all other cultivars. Kufri Jyoti

<table>
<thead>
<tr>
<th>Storage period (days)</th>
<th>Variety</th>
<th>% Sprouting</th>
<th>Sprout weight (g/Kg)</th>
<th>% Rottage by number</th>
<th>% Rottage by weight</th>
<th>% Physiological weight loss</th>
<th>% Total weight loss</th>
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<td>30</td>
<td>Atlantic</td>
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<td>-</td>
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<td>0.0 (0.0)</td>
<td>-</td>
<td>4.8 (12.6)</td>
</tr>
<tr>
<td></td>
<td>Frito Lay 1533</td>
<td>97.3 (84.7)</td>
<td>-</td>
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<td>0.6 (3.9)</td>
<td>-</td>
<td>6.5 (14.7)</td>
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<tr>
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<td>Kufri Jyoti</td>
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<td>0.7 (4.1)</td>
<td>0.6 (3.9)</td>
<td>-</td>
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<td>-</td>
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<td>(0.4)</td>
<td>(0.5)</td>
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<td>(1.7)</td>
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<td>-</td>
<td>7.5 (15.8)</td>
<td>6.8 (15.1)</td>
<td>-</td>
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<td>1.9 (6.5)</td>
<td>2.1 (6.8)</td>
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<td>13.8 (21.8)</td>
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<tr>
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<td>15.2 (22.9)</td>
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<td>10.0 (17.9)</td>
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<td>(1.6)</td>
<td>(1.6)</td>
<td>(1.6)</td>
<td>(1.2)</td>
<td>(2.5)</td>
</tr>
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</table>

Values in parentheses are transformed values
Keeping quality at room temperature

(87.8%) was the next best and was statistically at par with Kufri Chipsona-1 (93.3%). Tuber rottage was observed only in Frito Lay-1533 and Kufri Jyoti. Total weight loss was the lowest in Kufri Chipsona-1 (2.0%) followed by Atlantic (3.2%). Exotic cultivar Frito Lay-1533 recorded the highest weight loss (6.5%).

After 60 days storage, the sprouting was almost 100% in all the cultivars. Per cent tuber rottage was the lowest in Kufri Chipsona-1 (2.1%) and the highest in Frito Lay-1533 (12.6%). Kufri Chipsona-1 also showed significantly lower total weight loss (10%) as compared to all other cultivars. The highest total weight loss (20.7%) was recorded in Frito Lay-1533.

At 90 days of storage, all tubers of all cultivars were sprouted. The maximum sprout weight (10.7%) was recorded in Atlantic. Other processing cultivars did not differ among themselves for sprout weight. Among processing cultivars, the least tuber rottage was observed in Kufri Chipsona-1 (10.9%) followed by Kufri Jyoti (14.3%) and Kufri Chipsona-2 (14.8%). Both the exotic processing cultivars viz. Atlantic (30.8%) and Frito Lay-1533 (30.3%) exhibited high tuber rottage. The minimum physiological weight loss was observed in Kufri Chipsona-1 (12.4%). Relatively higher physiological weight loss was recorded in processing cultivars Kufri Chipsona-2 (15.4%) and Frito Lay-1533 (15.2%). The physiological weight loss in non-processing cultivar Kufri Pukhraj (20.2%) was the highest. The cultivar Kufri Chipsona-1 showed much lower total weight loss (22.2%) than all cultivars under test. Exotic cultivars Atlantic (44.0%) and Frito Lay-1533 (42.3%) recorded high total weight loss.

**Storage behaviour of spring crop:** The data on sprouting, rottage and weight loss in different cultivars during the period of storage are presented in **Table 2**. At 30 days of storage, there was no sprouting in any of the genotypes. Weight loss due to rottage was the lowest in Kufri Chipsona-1 (1.7%) followed by Kufri Chipsona-1 (0.0) - 15.1 (22.9)
Kufri Chipsona-1 0.0 (0.0) - 5.1 (13.1) 5.1 (13.1) - 14.2 (22.1)
Kufri Chipsona-2 0.0 (0.0) - 5.2 (13.1) 4.5 (12.2) - 13.8 (21.8)
Frito Lay 1533 0.0 (0.0) - 6.8 (15.1) 6.2 (14.4) - 15.7 (23.3)
Kufri Jyoti 0.0 (0.0) - 2.9 (9.4) 2.3 (8.7) - 10.7 (19.0)
Kufri Pukhraj 0.0 (0.0) - 3.2 (10.1) 2.6 (9.2) - 12.3 (20.5)
CD(0.05) (0.0) - 1.7 (1.0) 1.0 (1.0) - 1.4 (1.4)

30 Atlantic 0.0 (0.0) - 6.2 (14.4) 5.1 (13.1) - 15.1 (22.9)
Kufri Chipsona-1 0.0 (0.0) - 2.2 (8.4) 1.7 (7.2) - 7.5 (15.8)
Kufri Chipsona-2 0.0 (0.0) - 5.2 (13.1) 4.5 (12.2) - 13.8 (21.8)
Frito Lay 1533 0.0 (0.0) - 6.8 (15.1) 6.2 (14.4) - 15.7 (23.3)
Kufri Jyoti 0.0 (0.0) - 2.9 (9.4) 2.3 (8.7) - 10.7 (19.0)
Kufri Pukhraj 0.0 (0.0) - 3.2 (10.1) 2.6 (9.2) - 12.3 (20.5)
CD(0.05) (0.0) - 1.7 (1.0) 1.0 (1.0) - 1.4 (1.4)

60 Atlantic 0.0 (0.0) - 27.7 (31.7) 26.0 (30.6) - 34.9 (36.2)
Kufri Chipsona-1 0.0 (0.0) - 5.5 (13.5) 5.1 (12.9) - 14.2 (22.1)
Kufri Chipsona-2 0.0 (0.0) - 13.6 (21.5) 12.3 (20.4) - 24.0 (29.3)
Frito Lay 1533 0.0 (0.0) - 25.5 (30.3) 24.7 (29.7) - 31.9 (34.4)
Kufri Jyoti 0.0 (0.0) - 5.2 (13.0) 5.0 (12.6) - 15.9 (23.5)
Kufri Pukhraj 0.0 (0.0) - 6.5 (14.7) 5.9 (14.0) - 17.6 (24.7)
CD(0.05) (0.0) - 1.5 (1.5) (1.7) (1.7) - (1.9)

90 Atlantic 1.3 (5.4) 0.1 (1.9) 35.6 (35.4) 31.9 (34.4) 11.2 (19.5) 48.4 (44.1)
Kufri Chipsona-1 0.8 (4.5) 0.1 (1.8) 9.0 (17.4) 6.6 (14.8) 13.0 (21.1) 20.8 (27.1)
Kufri Chipsona-2 0.0 (0.0) 0.0 (0.0) 16.0 (23.6) 14.4 (22.2) 18.1 (25.2) 34.6 (36.0)
Frito Lay 1533 2.3 (7.0) 0.1 (1.9) 29.6 (32.9) 29.8 (33.0) 18.1 (25.1) 50.5 (45.3)
Kufri Jyoti 5.3 (10.3) 0.1 (1.8) 10.1 (18.5) 9.5 (17.8) 12.1 (20.3) 21.7 (27.8)
Kufri Pukhraj 13.3 (16.4) 0.1 (1.8) 10.7 (19.1) 9.2 (17.5) 15.1 (22.8) 23.2 (28.8)
CD(0.05) (1.3) (0.16) (1.7) (2.2) (1.2) (2.2)

Values in parentheses are transformed values
Jyoti (2.3%) and Kufri Pukhraj (2.6%). Highest tuber rottage was observed in Frito Lay-1533 (6.2%) followed by Atlantic (5.1%). Total weight loss in tubers was significantly lower in Kufri Chipsona-1 (7.5%) than all other cultivars. Exotic cultivars Frito Lay-1533 (15.7%) and Atlantic (15.1%) exhibited high total weight loss.

At 60 days of storage at room temperature, tubers of all the cultivars were dormant. Tuber rottage was the lowest in Kufri Jyoti (5.0%) followed by Kufri Chipsona-1 (5.1%). Exotic cultivars Atlantic (26%) and Frito Lay-1533 (24.7%) showed high rottage. Total weight loss was the lowest in Kufri Chipsona-1 (14.2%) followed by Kufri Jyoti (15.9%). High total weight loss was observed in Atlantic (34.9%) and Frito Lay-1533 (31.9%). The results indicated that both the exotic processing cultivars had poor keeping quality and were unsuitable for 60-day storage period at ambient temperatures under north Indian conditions.

At 90 days of storage, there was no tuber sprouting in Kufri Chipsona-2. Other processing cultivars also showed very low tuber sprouting, the maximum being in Kufri Jyoti (5.3%). Kufri Pukhraj, the non-processing variety, showed relatively high (13.3%) tuber sprouting. Tuber rottage in processing cultivars was low, minimum being in Kufri Chipsona-1 (6.6%) followed by Kufri Jyoti (9.5%). High tuber rottage was recorded in Atlantic (31.9%) and Frito Lay (29.8%). Per cent physiological weight loss was minimum in Atlantic (11.2%) followed by Kufri Jyoti (12.1%) and Kufri Chipsona-1 (13.0%). High physiological weight loss was recorded in Kufri Chipsona-2 (18.1%) and Frito Lay-1533 (18.1%). Total weight loss was low in Kufri Chipsona-1 (20.8%) and Kufri Jyoti (21.7%). Exotic cultivars Atlantic (48.4%) and Frito Lay-1533 (50.5%) exhibited very high total weight loss.

After harvest, the prevailing high temperatures and low humidity cause heavy loss in weight and quality of potatoes. Hence, cultivars showing good keeping quality have high significance for processing industry. The results of present study showed that Kufri Chipsona-1 had better keeping quality than other processing cultivars. This confirmed earlier findings of Patel et al. (7). Spring harvest of Kufri Jyoti also had good keeping quality. This will ensure wider acceptability and greater utilization of these two cultivars. Our study also indicated relatively poor storability of autumn crop potatoes at ambient room temperature. For prolonged availability of good quality tubers for processing, therefore, storage of autumn crop produce at relatively lower temperatures (preferably after treatment with sprout suppressants) and a staggered planting of the crop as suggested by Pandey et al. (6) would be useful. The spring crop harvested tubers, in the present study, kept well at ambient room temperature. For about 2 months, tubers of all cultivars remained dormant. In addition, Kufri Chipsona-1 and Kufri Jyoti showed very low tuber rottage and total weight loss indicating that use of these cultivars, especially Kufri Chipsona-1, the preferred one for processing (2), would help farmers retain the produce on-farm, release it slowly in the market and avoid glut situations. This will help not only in stabilizing potato price in the market, but also in accruing higher returns to the farmers.

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LITERATURE CITED


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