CHANGES IN TEMPERATURE AND RELATIVE HUMIDITY IN HEAP AND PIT DURING STORAGE OF POTATOES

Vijay Paul1 * and R. Ezekiel2

1 Central Potato Research Institute Campus, Modipuram-250110, Meerut, UP, India.
2 Central Potato Research Institute, Shimla-171001, HP, India.

* Present address: Division of Plant Physiology, I A R I, New Delhi-110012, India.

ABSTRACT: Potatoes of two varieties, viz., cvs. Kufri Bahar and Kufri Jyoti were stored in heap and pits for 90 days and changes in temperature and relative humidity (RH) were monitored during the storage period. Compared to the ambient, the decrease in temperature inside heap, katcha pit and pucca pit was 12.3, 13.6 and 13.4°C, respectively and the increase in RH was 12.8, 23.2 and 25.5%, respectively. While the ambient temperature increased by 12.6°C during day time, an increase of only 1.2°C was observed inside katcha and pucca pits.

Potatoes are stored on-farm in heap and pits in the Malwa region of Madhya Pradesh for 3-4 months (Ezekiel et al., 2002). Storage in heap and pits is not only economical but also stored potatoes are suitable for processing since they contain high dry matter and low reducing sugars. Though many studies have been carried out on storage of potatoes in heap and pits, little information is available on temperature and relative humidity prevailing in heap and pits during the storage period. The aim of this study was to store potatoes in heap and pits in the central Indo-Gangetic plains and to monitor temperature and relative humidity, and to see how they affected the storage behaviour of potatoes.

Potatoes of two varieties, viz., cvs. Kufri Bahar and Kufri Jyoti were grown at the Central Potato Research Institute Campus, Modipuram following the recommended package of practices. Haulms were cut 110 days after planting and after allowing 12 days for skin curing, the tubers were harvested and kept in a shed at ambient temperature for 12 days to facilitate wound healing. One tonne of healthy, well cured tubers were stored in a heap, katcha pit and pucca pit on 11th March, 1999 and 2000. The heap measured 3x1.8x0.9 m and the pits were 1.5 m in diameter and 1.5 m deep. During the loading, perforated PVC pipes were placed in heap and pits for taking temperature and relative humidity measurements. After loading, the potatoes were covered with 25 cm thick paddy straw. A roof made of chatai (mat) was raised 3 feet above the pits, to protect the potatoes from heat and rain. Temperature and relative humidity (RH) were recorded weekly using a battery operated, digital hygro-thermometer with probes fixed at the end of a 5 m cable. The probes were inserted through the PVC pipes and the probes were held at 5, 30 and 55 cm from the bottom of the heap and at 15, 45 and 90 cm from the bottom of the pits, and temperature and RH were recorded. Day time variation in temperature and RH were recorded outside (ambient) and in the pits. For measuring day time variation, temperature and RH were recorded at 2 h intervals beginning from 0600 h to 1800 h. The lid of the pipe was replaced immediately after recording the observations. After 90 days of storage, heap and pits were opened and observations were recorded on weight loss, rottage and total storage losses.

Maximum ambient temperature during the storage period was 41.3°C while the maximum temperatures observed in heap, katcha pit and pucca pit were 30.1°C, 29.8°C and 30.2°C, respectively. (Fig. 1). The decrease in temperature from the ambient was 12.1-12.9°C in heap, 11.5-13.6°C in katcha pit and 11.1-13.8°C in pucca pit. A decrease of 8-13°C inside a pucca pit has been reported (Kaul et al., 2002). The maximum ambient RH was 71%. An increase in RH of 12.3-16.9% in heap, 21.7-25.2% in katcha pit and 25.9-27.9% in pucca pit was observed. An increase of 8.3% in RH inside a pucca pit has been reported (Kaul et al., 2002). While the ambient day temperature showed considerable fluctuation i.e. an increase of 12.6°C was observed from morning till evening, the temperature inside the pits remained more or less steady. An increase of only 1.2°C was observed inside katcha and pucca pits during the course of the day (Fig. 2). There was not much difference in the temperature and RH at different positions within the pits. Ezekiel et al. (2002) observed that in larger pits with depths of 12-15 ft, for every 2 ft height there was a temperature gradient of 0.2-0.9°C in katcha pit and 0.2 – 0.7°C in pucca pit. They also observed a decrease of 5% in RH with an increase of 2 ft in height from the bottom level. The lack of a gradient in temperature and RH in this study could be attributed to smaller size of the pits. The temperature inside the heap and pits are comparable to the temperature range reported by Srivastava and Singh (1979) for katcha storage structure. Weight loss in heap, katcha pit and pucca pit was 10.8, 9.9 and 8.7% respectively, in Kufri Bahar. The weight loss in Kufri Jyoti was 9.7, 6.2 and 6.6%, respectively. Rottage in heap, katcha pit and pucca pit was 3.3, 3.1 and 4.3%, respectively, in Kufri Bahar and 2.6, 3.5 and 2.2%, respectively, in Kufri Jyoti. Total losses were 15.8, 15.5 and 15.6% in heap, katcha pit and pucca pit, respectively, in Kufri Bahar.
and the differences were statistically non-significant. In Kufri Jyoti, the total losses were 12.8, 10.9 and 9.7% in heap, katcha pit and pucca pit, respectively, and the total losses in heap was significantly higher than that in katcha pit. Total losses of 12.9 and 21% have been reported for heap and pits, respectively, after 110-120 days of storage (Ezekiel et al., 2002).

**Literature cited:**

