

9. Productivity in on-farm demonstrations

Average yields of NKK and Yusi Maap across five Dzongkhags of Bumthang, Chhukha, Gasa, Haa and Wangdue for 2017 to 2019 were 10.42 and 10.52 tons/acre, respectively. Yusi Maap showed slightly higher average yield than NKK. However, Desiree variety yielded 7.30 tons/acre on an average across Dzongkhags and over the years. Being one of the oldest varieties, Desiree consistently showed lower productivity compared to the other two varieties. Even though Desiree was a popular variety in the past, overall crop performance of Yusi Maap and NKK in terms of yield was about 30% higher. However, Yusi Maap yielded highest in lower elevation of Chhukha and the least at higher elevation of Haa.

10. Farmers' preferences

Both the new potato varieties received higher number of preference votes in comparison to the old variety Desiree in all the three years across the five districts. Generally, most preferred variety was Yusi Maap in all districts (Fig. 5). This reflects farmer's preference for red-skinned variety due to better productivity and marketability as red-skinned varieties are preferred by consumers as well as by the bidders at all the FCBL auction yards. Additionally, due to its colour Yusi Maap is more preferred over white-coloured NKK.

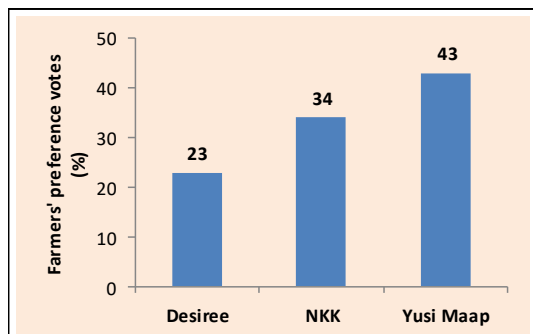


Fig.5. Farmers' preferences

7. Reinforcement of ridges

Reinforcing of the ridges by earthing up should be done one and half month after planting which



Fig. 4. Stolons vulnerable in late earthing up

should coincide with the first weeding. The earthing up operation should be done carefully to avoid disturbing the stolons and roots (Fig. 4). Since potato is a modified stem, it needs to be covered with soil in order to enhance productivity. Earthing up improves soil aeration reduces weed pressure and increases stem density. Second weeding can be done as soon as the crop gets weedy. However, earthing up operation should be avoided once the plants approaches/reaches flowering stage to prevent disturbance/damage to the stolons or the tuber formation process.

8. Harvesting and storage

When the haulm turns yellow and starts to die off, then one should realize that the harvesting time has been reached. Crop can be harvested using a power-tiller or long handled spade. Shake the soil off from tubers. In curing process, the harvested tubers are spread and allowed to be dried. This process will help hardening of the tuber skin; remove soil adhered with the tubers. Best curing takes place at 15 to 18 °C. Store in a dark and cool place in order avoid glycoalkaloid formation. Under exposure to light, potatoes turn green spoiling the taste.



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Yusi Maap: A Potato Variety with Valuable Traits



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1. Significance of potato farming

Potato is an important commodity, mainly cultivated by high-altitude farmers, that sustains and supports their livelihood. The popularity of potato cultivation among Bhutanese farmers can be attributed to the crop's adaptability to a wide range of agroclimatic conditions such as a rainfed crop, high productivity, an assured market, and a reliable source of income for the farming families. Further, most Bhutanese farmers cultivate it because there are not many feasible alternatives in the high altitudes. However, due to late-blight infestation of old varieties, yield in Bhutan has stagnated over the years. New potato varieties of Yusi Maap and Nasephey Kewa Kaap (NKK) have the abilities to resist the menace due to late-blight.

3. Varietal traits of Yusi Maap

Yusi Maap has gained particular prominence in Bhutan due to its valuable characteristics. Its germplasm identity number is CIP392797.22. The variety is resistant to potato viruses of PVX, PVY and PLRV. Most important attribute with regard to Bhutanese farming is its moderate resistance to late-blight. In control trials, the variety yielded in the range of 11 to 17 tons/acre, which is much higher than that of the famous Desiree in Bhutan. This variety produces oblong tubers. Its red-skinned tuber is intricately linked to high marketability because the red-skinned potatoes fetch higher prices than the white-skinned potato while trading. It is also dense in micro-nutrients which can reduce malnutrition on consumers. The sprouts are purple in colour (Fig.1).



Fig.1. Yusi Maap Sprouts

4. Agroecology

Yusi Maap is suitable variety for mid and high altitude agroecologies in Bhutan. In mid-altitude Dzongkhags like Chhukha, Trashigang, Mongar, and Pemagatshel, the crop should be planted in December and January. However, in the high-altitude places like Bumthang, Phobjikha and Gasa, it should be planted in February to March, and should be based on the onset of warm season. The variety takes 120-140 days to mature from planting. If there are no signs of tubers sprouting, they may still be in a period of dormancy since most potatoes undergo a dormant period. Therefore, one should be mindful to note this requirement.

5. Identification of the variety

The variety can be identified in the field by looking at the dark green colour of the leaves and the flowers are purple (Fig. 2) in colour. The tubers are oblong in shape



Fig.2. Yusi Maap Flowers

and the tubers can be identified as deep pinkish red while peeling. The cross-section of a tuber shows light yellow creamy colour. It takes slightly longer time for cooking compared to Desiree.

6. Micro-nutrient content (CIP, 2014)

Micro-nutrient	Content
Vitamin C	59.85 to 89.7 mg/100g dry weight basis
Iron	> 18.45 mg/kg dry weight basis
Zinc	> 16.5 mg/kg dry weight basis

7. Planting method

The length of dormancy varies with the variety. Yusi Maap has a minimum dormancy of four months. Prior to planting, soil is prepared into raised ridges (rows) with the distance of 50-70 cm between the ridges. Potato tubers are generally planted with a distance of 15-20 cm between the plants. Usually, Yusi Maap has less proportion of seed-size tubers of 35 to 65g/tuber (or tuber diameter of 25 mm to 50 mm). This leads to a shortage of seed-size tubers for planting. Hence, in the absence of sufficient seed-size tubers, table-size tubers need to be cut into two pieces before planting (Fig. 3). Seed rate of Yusi Maap is 1000 to 1200 kg per acre.



Fig.3. Table-size tubers cut into two pieces before planting

8. Roguing and seed selection

Roguing is the act of identifying and removing plants with undesirable characteristics from the fields. Roguing/removal of off-types and diseased plants – this can be best performed in flowering stages as off-types can be easily identifiable then. Besides, the crop infestation by late-blight can be easily observed when the crop reaches flowering stage. Any crop showing the signs of late-blight infestation and potato leaf roll virus (PLRV) should be avoided as the seed plot. Varietal purity of foundation seed is required to be 99% and that of certified seed is 98% and should be true to the type. Crop rotation is important to avoid volunteers from previous season from contaminating the purity.