Potato Varieties Suitable for Cultivation in Madhya Pradesh

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Potato (Solanum tuberosum L.) is the world’s single most important non cereal crop with a vital role in the global food system. Madhya Pradesh is 6th largest producer of potato in India. Malwa region plays important role in potato production. Indore district alone is contributing around 30% in area as well as in production of the state of Madhya Pradesh. Madhya Pradesh has in recently emerged as an ideal destination for processing potato retail hub. Out of 50 varieties of potato developed by CPRI, Shimla, 20 varieties are suitable for cultivation in Madhya Pradesh which farmers can grow according to market demand, climatic requirement and for table and processing purpose.

Introduction

Potato (Solanum tuberosum L.) is the world’s single most important non cereal crop with a vital role in the global food system. It can be compared only with rice, wheat and maize for its contribution towards securing the food and nutrition, and eradicating malnutrition and hunger, especially in developing world (Swaminathan 2001 and Naik 2005). The crop has the capacity to produce more food per unit time and area and has high nutritional value to sustain burgeoning population.

Madhya Pradesh is 6th largest producer of potato in India. Area under potato was 0.18 mha and production was 2.69 mt with average productivity of 22.0 t/ha during 2011-12 (http://nhm.nic.in/Archive/ICAR_5.pdf). However, its importance can be gauged from the fact that most of the potato based industries either procure significant quantity of raw material or have established their processing units in the state especially in Malwa region. Malwa region plays important role in potato production. Major potato growing areas are Indore, Ujjain, Dewas, Shajapur and other minor areas in MP are Chhindwara, Sidhi, Satana, Rewa, Sarguja, Rajgarh, Sagar, Damoh, Chhindwara, Jabalpur, Panna, Morena, Chhatarpur, Vidisha, Ratlam, Betul and Tikamgarh.

Indore district alone is contributing around 30% in area as well as in production of the state of Madhya Pradesh. Potato is predominantly cultivated in Indore district of Madhya Pradesh insosoybean- potato, soybean- potato – Wheat croppingsystems (Mishra et al., 2009). An Agro-climatic region for potato falls under West central plains and North-eastern Plains of potato.
zones. Potato crop can be grown during winter under mild temperatures and short days Conditions of October to February/March. Main Crop of potato is grown during October/November to February/March (Dandekar et al., 2009). The region experiences near optimal conditions for potato crop growth during winters i.e. abundant sunshine, near optimal temperatures and reduced risk of frost and late blight. This region experiences milder winter while the season before and after potato is similar to that of the north-western plains (Pandey et al, 2008).

Malwa Region- Potato Processing Hub of India
The demand for processed potato products like chips and French fries is increasing continuously mainly due to improved living standard, increased urbanization, preference to fast foods and expanding tourist trade. Moreover value added processed products are opening up new market avenues in the national and international markets, and as a result, the farmers are finding it remunerative to grow processing varieties of potatoes. There is a big market for dehydrated potato chips, cubes and other products which can be easily prepared at the small scale industry level and can provide employment to the rural youth and village women. The north-western and west-central plains are ideal for providing raw material to these industries. However, potatoes produced in cooler north-western and west-central plains are generally considered unsuitable for processing as they contain low dry matter and high reducing sugars (Pandey et al, 2005). It has been reported (Ezekiel et al., 1999) that areas having minimum night temperature above 10°C during the last 30 days of the crop growth produce potatoes with high dry matter (>20%) and low reducing sugars <150mg/100g fresh wt.) Such condition is prevalent in certain parts of Rajasthan and Madhya Pradesh, north-eastern plains, the entire plateau and foothills of Himalayas. Malwa potato has gained reputation for potato chips processing due to potatoes have a quality of high dry matter & low sugar, which is a gift of nature (www.mponline.com, 2013). Potatoes for processing are, therefore, procured by the industries during December to June from Malwa region of MP (Pandey et al, 2005), hence central Indian state of Madhya Pradesh has in recently emerged as an ideal destination for processing potato retail hub.

![Fig. 1: Potato cluster in Madhya Pradesh](image)
Following are the advantages that Madhya Pradesh possesses for potato processing:

1. 70% of potato for processing Industries is procured from Madhya Pradesh
   - Low sugar, High dry matter, Long storage life
   - Largest storage capacity of process grade potato
2. Farmers are aware of quality parameters
   - Adapted to agricultural practices for quality results
3. Time bound production pattern followed by farmers
   - Early, main, long storage crops
4. Maximum no. of process grade cold storages in the country in Malwa region (700,000 tons) (Mandloi N, 2012)

   Hence there is high demand for processing varieties in Madhya Pradesh. This article presents details of varieties for processing and table purpose potato along with their tuber characteristics recommended for Madhya Pradesh region (Dandekar et al., 2009) (Fig. 2).

Varietal Development by CPRI
Central potato research institute since its inception developed 50 high yielding varieties for diverse agro-climatic regions. Out of which 24 are suitable for plains. 20 possess multiple resistances to different biotic and abiotic stresses. 6 are suitable for processing.

Selection of Variety for Cultivation
Potato variety for cultivation can be selected according to the soil and climatic conditions as well as market demand and susceptibility to disease like potato late blight, which causes maximum damage to the potato crop. Potato varieties used for making chips have uniform round/oval tuber shape, size, and shallow eyes, however, varieties with oblong tubers and shallow eyes are considered suitable for French fries. After the development of high yielding variety KufriFrysona state of Madhya Pradesh can also be one of the ideal locations for production of potatoes suitable for French fries. These varieties are generally low in reducing sugars which can avoid browning in chips or fries.

Climate and Soil Requirements
Potato is basically a crop of temperate region but there is a large variation in the gene pool with respect to crop's response to thermo periods. Generally potato crop is raised in India when maximum temperatures are below 35°C and minimum temperatures below 20 °C (with ideal tuberization temperature between 16-18°C).

Soil: Potatoes can be grown in alluvial, hill, black, red and laterite soils having pH in the range of 5.5-8.0. Deep Alluvial soils of Indo-Gangetic plains with almost neutral soil reaction are the most suitable. Maximum area under potato is in alluvial soils, followed by hill, black and red soils. Saline, alkaline and sodic soils are however, not suitable for potato production. Soil should be fine, loose and without compacted layers that hinders root penetration and de-shapes tubers. Compacted layers also restrict drainage of water. Clods and stones present reduce root contact with soil and also cause deformation of tubers. Well-drained coarse or sandy loam to loamy soils, rich in organic matter are ideal for potato cultivation. Such soils ensure availability of
sufficient oxygen for the growth of roots, stolons and tubers, retain moisture and are helpful in drainage of excess water that allows production of beautiful tubers.

**Early Duration Varieties**

**Kufri Lauvakar**: It is an early maturing variety (75-80 days) and can be grown both in Kharif and Rabi seasons. It can build up yields rapidly under warmer climate. The variety is susceptible to major diseases. The yield potential is 30 t/ha. The tubers of the variety are large, round, white, fleet eyes with prominent eyes brows, flesh white and can be used for chip making.

**Kufri Chandramukhi**: It is an early maturing variety (80-90 days). The variety is susceptible to major diseases. The yield potential is 25 ton/ha. The tubers of the variety are large, oval, slightly flattened, white, fleet eyes, flesh dull white, and largely for table purpose as having very good taste.

**Kufri Surya**: It is an early maturing (75-90 days) heat tolerant variety and can be grown in warmer areas. The variety is resistant to hopper burn and immune to wart, mild resistant to late blight, moderate resistance to mite damage. The yield potential is 35 ton/ha. This variety yields excellent defect free tubers with high proportion of large (>85mm) tubers.

**Kufri Pukhraj**: It is an early maturing variety (75-90 days). The variety is resistant to early blight and moderately resistant to late blight. Immune to wart. The yield potential is 40 ton/ha. Tubers are white, large, and oval and are suitable for table purpose.

**Kufri Ashoka**: It is an early maturing variety (70-80 days). The variety is susceptible to late blight. The yield potential is 35 ton/ha. Tubers are large, oval-long with white flesh and are suitable for table purpose.

**Kufri Khyati**: Early maturing variety (70-80 days) with moderate resistance to late blight. The variety yields higher than exiting early cultivars both at 60 and 75 days after planting. It possesses good keeping quality and moderate tuber dry matter (15%). Tubers are medium-large, round-oval with cream flesh and are suitable for table purpose.

**Medium Duration Varieties**

**Kufri Jyoti**: It is a medium maturing variety (90-100 days). The variety is moderately resistant to late & early blight. Resistant to wart. The yield potential in plains is 30 t/ha. Tubers are large, oval having tendency to crack and suitable table and also for instant flakes and chips.

**Kufri Chipsosa-1**: It is a medium maturing variety (90-100 days). The variety is resistant to late blight. The yield potential in is 35 t/ha. Tubers are white, medium to large, oval. It has high dry matter, low reducing sugars and low phenols which make the variety suitable for chips, French fries and owing to its excellent taste it is also becoming popular as table purpose variety.

**Kufri Chipsosa-3**: It is a medium maturing variety (90-110 days). The variety is resistant to late blight. The yield potential in is 35-40 ton/ha. Tubers are round to oval. It has high dry matter, low reducing sugars and low phenols which make the variety suitable for chips and flakes.
Kufri Chipsona-4: It is an early-medium maturing variety (90-100 days). The variety is resistant to late blight. The yield potential is 30-35 ton / ha. It has high dry matter, low reducing sugars and low phenols which make the variety suitable for chips and flakes.

Kufri Frysona: It is a medium maturing variety (100-110 days). The variety is resistant to late blight. The yield potential is 30-35 ton / ha. It has oblong tubers, high dry matter, low reducing sugars and low phenols which make the variety suitable for French fries.

Kufri Bahar: It is a medium maturing variety (90-110 days). The variety is Immune to wart. The yield potential in plains is 35 ton / ha. Suitable for table purpose

Kufri Badshah: It is a medium-late maturing variety (100-110 days). The variety is moderately resistant to early and late blight. Resistant to Potato Virus X. The yield potential in is 50 ton / ha. Tubers are large, oval and smoothskinned. Used for table purpose and not suitable for processing.

Kufri Jawahar: It is a medium maturing variety (80-90 days). The variety is moderately resistant to late blight and immune to wart. The yield potential in is 35-40 ton / ha. Tubers are Creamy white with pale yellow flesh. Used for table purpose.

Kufri Sutlej: It is a medium maturing variety (90-100 days). The variety is moderately resistant to late blight. The yield potential in is 40 ton / ha. Tubers are large, oval with white flesh. Suitable for table purpose and not suitable for processing.

Kufri Anand: A medium maturing variety (90-110 days). The variety is resistant to late blight, tolerant to hopper burn. Tubers are large, oval-oblong, white skinned with fleet eyes. Good for growing in spring season and gives average yields of 35-40 t/ha. Suitable for table purpose and not suitable for processing.

Kufri Pushkar: A medium maturing variety (90-100 days). The variety is resistant to late blight and early blight and on an average yields 30-35 t/ha. The tubers are medium, round-oval, white, and fleet to medium deep eyes with light yellow flesh. Used for table purpose.

Kufri Garima: A medium maturing variety (90-100 days). The variety possesses field resistance to late blight. Its tubers are light yellow, ovoid with shallow eyes and light yellow flesh colour. It is capable of yielding 30–35 t/ha under optimum agronomical practices. Suitable for table use.

Medium-long Duration Varieties

Kufri Himsona: It is a medium-late maturing variety (110-120 days). The variety is resistant to late blight. The yield potential is 30-35 ton / ha. It has high dry matter, low reducing sugars and low phenols which make the variety suitable for chips and flakes.

Kufri Sindhuri: it is long duration/late maturing variety (110-120 days). The variety is moderately resistant to early blight and tolerant to PLRV. Can tolerate temperature and water stress. The yield potential in is 35 ton / ha. Tubers are round, medium, red and smooth skin. Suitable for dehydrated dice, instant flakes and canning.
Conclusion

Farmers of the Madhya Pradesh can select the variety according to their choice like processing varieties for Malwa region, short and medium variety according to duration, also farmers can choose varieties for seed production for the region and nearby area in Gwalior Chambal belt of Madhya Pradesh as this area is most suitable for seed production due to low aphid population during main crop from Mid-October to Mid-January.

References

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