

Exploring Untapped Potential of Potato for Masses

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Abstract: *Potato (Solanum tuberosum L.) is the most important food crop of the world. Potato crop produces more edible energy and protein per unit area and time than many other food crops. It fits well into multiple cropping systems prevalent in tropical and subtropical agro-climatic conditions. And the high profitability of potato as a cash crop has made it a viable commercial enterprise. In recent years potato processing industry has grown rapidly in India due to rapid urbanization and changing life style of the people. The protein content in potato consist a high biological value than cereals. Consequently, potato is supplementing meat and milk products by lowering energy intake and ultimately reducing food cost for poor man. Thus, the importance and potentiality of potato remain untapped for long period.*

Keywords: Food and Nutrition, Irrigation, Potato, *Solanum tuberosum* L, Tuber yield

1. Introduction

Burgeoning human population is pushing up the demand for food, which needs to be met through enhanced productivity per unit area and time. In this context, importance of potato (*Solanum tuberosum* L) is noteworthy for several reasons. Firstly, potato crop produces more edible energy and protein per unit area and time than many other food crops. Secondly, potato fits well into multiple cropping systems prevalent in tropical and subtropical agro-climatic conditions. Thirdly, the high profitability of potato as a cash crop has made it a viable commercial enterprise. Potato is the most important food crop of the world and has always been the poor man's food.

In India potato was introduced by colonial rulers Portuguese or British and since then it was primarily being grown only in the backyards of the British people till independence (Luthra et al. 2006).

It is an important source of food, employment and income in developing countries (FAO, 2008). Potatoes are grown and eaten locally, with little significant international trade compared to cereals, so they are particularly valuable as food in the developing countries. Potatoes mature in 3-4 months and can yield about 40 tons/ha (FAO, 2008) and hence ideally suited to places where land is limited and labour is abundant (FAO, 2008; Taiy et al 2016). There is general appreciation of the benefits derived from abundance of potato in diet. Therefore, cultivation and consumption of potato is constantly increasing.

Potato production in India has undergone a revolution since independence, as the total production has risen from 1.54 mt in 1949 to 45.35 mt in 2013 from an area of 1.99 m ha with an average productivity of 23.0 t/ha (FAOSTAT, 2013). Ninety percent of the potatoes in India comes from the Indo-Gangetic planes. Major potato growing states are Uttar Pradesh, West Bengal, Bihar, Madhya Pradesh, Punjab and Gujarat (MoEF&CC).

Potatoes are popular throughout the world is due to that they can be vegetative propagated. This allows growers, large or small, to save some of the crop to replant as seed potatoes to

both increase the food supply and maintain a desired variety. It's a short duration crop and produces highest food energy per unit of land. It has become an integral part of the Indian diet and its usage is on the rise. It is no more a vegetable crop in view of its production potential and nutritional value (Hussain, 2016).

At present India is not only self sufficient in potato production but can also export seed potatoes to other countries as India has well established seed production techniques to produce disease free seed potato.

In recent years potato processing industry has grown rapidly in India due to rapid urbanization and changing life style of the people. The present requirement is around 3.5 mt which accounts to 7.73% of the total potato production and is expected to increase rapidly in the coming years (MoEF&CC)

The protein content in potato consist a high biological value than cereals. Consequently, potato is supplementing meat and milk products by lowering energy intake and ultimately reducing food cost for poor man.

High transaction costs, price inefficiencies and quality losses lead to minimal returns to farmers (Kaguongo *et al.*, 2008, Taiy et al 2016). The market is controlled by cartels, which shield producers from receiving any market information. Due to the highly perishable nature of the potato, prices fall during the glut season, hence low net returns to farmers. Transportation of potatoes to the market is expensive due to poor road infrastructure in the producing areas (Hoeffler, 2005, Taiy et al 2016). Packaging of the potato in extended bags of 160 kilograms (kg) has led to exploitation of farmers by traders (Gathumbi, 2009, Taiy et al 2016).

Importance of potato

Potato produces more protein and calories per unit area per unit time and per unit of water than any other major food plant. One hectare of potato can yield two to four times the food quantity of grain crops.

Nutritive Value:

The constituents of potato per 100 gms.

| Constituents | Weight (grams) |
|----------------------------------|----------------|
| Water | 74.70 |
| Carbohydrates (Starch and Sugar) | 22.60 |
| Proteins | 1.60 |
| Fibre | 0.40 |
| Fat | 0.10 |
| Minerals | 0.60 |

Source: Potato in India, Central Potato Research Institute (CPRI), Shimla

Potato production

Climatic and soil requirements

Potato being a temperate crop requires a cool temperature however at low temperature vegetative growth is restricted and at freezing point temperature irrecoverable frost injury occurs to the crops. It thrives best in cool regions where there is sufficient moisture and fertile soil. Optimum temperature for vegetative growth is around 24^{0c} and that for tuberisation is 18-20^{0c}. Higher soil temperatures adversely affect the tuber development. High humidity, along with cloudy days, is injurious to potato, because the crop is attacked by fungal diseases mainly late blight caused by *phytophthora infestans* under such conditions. Sunshine coupled with cooler nights is essential for reducing the spread of diseases (Cheema et al 1991).

Soil requirements

Good potato production starts with good field selection followed by correct tillage practices. Potatoes prefer organic rich, well-drained, sandy or medium loam soil for best growth. Most favourable soil pH should be between 5.0-7.0 as the crop does not grow well in saline-alkali soils and under highly acidic conditions it suffers from scab disease (Singh 1988).

Seed and sowing

Potato is commonly vegetatively propagated, hence the disease pathogens are carried from the mother plants and the crop gets spoiled, therefore, pure and healthy seed is the basic necessity for successful cultivation of potato crop. The seed tubers are treated to protect them from an attack of fungal diseases when sown in the field and to get higher germination there from. The optimum time of planting potato synchronises with the period when maximum temperature is about 30-32^{0c} and minimum around 18-20^{0c}. While, the ideal tuber size for planting should be 2.5 to 3 cm in diameter and approximately 50gm in weight (Singh 1988).

Potato seed pieces 10-15 cm deep and 25-30 cm apart in the row. Space the rows 75-90 cm apart.

Water management

Irrigation water is one of costliest inputs used in crop cultivation. The primary attention centers round judicious use of irrigation water and improving water use efficiency to the highest possible limit. Various workers have reported the decrease in tuber of potato with the increase of soil moisture tension. Potatoes require good soil moisture levels throughout the year, so apply 2.5-5.0 cm per week. Potatoes should be irrigated time to time in case field becomes very dry and there is irrigation facility.

Fertilization application

Avoid heavy fertilization of potatoes which encourages excessive foliage growth and delays tuber growth. Potassium is one of major nutrients for potato. It is used to activate several enzymes involved in carbohydrate and nucleic acid metabolism. Potassium increases the formation and translocation of carbohydrates, keep iron more mobile and enhances the hydrolytic activity of enzymes. Apart from aforesaid merits, potassium also imparts winter hardiness, develop disease and drought resistance, regulates stomatal movement and improves water use efficiency. Recent evidences also suggested that a high level of potassium in plant reduces the transpiration loss by closing the stomata. This effect is beneficial for maximum utilization of available water by the plants. Roy (1964) found increased plant height, more number of branches, leaves and yield of tubers per plant as well as higher economic return on application of 100:80:60 kg of NPK per hectare.

Problems

Weeds

Hand weeding of the plot should be done with the help of *khurpi* at 30 days after planting to keep the crop free from weeds to avoid the competition for critical inputs. Earthing up done with the help of space after hand weeding to provide cover to the tubers.

Insects and Diseases

Phorate 10 G @ 10 kg/ ha should be applied at the time of planting as basal to control the insect pests of the crop. Two spraying of Indofil M-45 @ 0.2 % solution will be beneficial if applied at 45 and 55 days after planting to control late blight of potato.

Harvest and Storage

Potatoes can be harvested when haulms die down naturally and tuber skin is hardened, but before the soil temperature rise above 27-28^{0c} to prevent charcoal rot of tubers which is common in late harvested crops in plains. Potatoes are perishable in nature and have to be kept in proper stores to avoid rotting of tubers. In plains the seed tubers may be kept in cold stores between February-March to September – October (Singh 1988). Good air circulation will reduce rotting and sprouting.

2. Conclusions

Potato is one of the most important crops in the world today. Potato produces more protein and calories per unit area per unit time and per unit of water than any other major food plant. Potato is a highly perishable produce and its quality deteriorates fast after harvest. To enhance our preparedness and to formulate a sound plan of action, we need to identify gaps in vital information, prioritize research on point of view of potato farmers, so that policy issues, adaptation strategies and mitigation technologies could be worked out and challenges could be converted into opportunity for potato farmers.

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