

Physalis peruviana:

A profitable cash crop for small farmers

Saurabh Pagare¹, Bhumesh Kumar², Disha Jaggi³ and P K Singh⁴

ICAR-Directorate of Weed Research, Jabalpur 482 004

Ensuring food security ought to be an issue of great importance for a country like India where about one-third of the population is estimated to be absolutely poor and malnourished in one way or another. Food availability and accessibility are necessary conditions for food security. Due to changes in consumption patterns, demand for fruits, vegetables, and other food products has been increasing, hence, there is a need to increase crop diversification. Adoption/domestication of wild/weedy species which are nutritionally sound, environmentally well adapted and locally acceptable will go a long way in alleviating malnutrition and ensuring food security with dietary diversity. Address to above problems will definitely pave the way towards achieving food security with acceptable nutritional status. There is untapped potential for increasing the range of food products suitable for human consumption. Farmers should be encouraged for commercial cultivation of locally available plant species which yet to be recognized as a crop. Cultivation of Physalis peruviana (Rashbhari) is a viable and one of the profitable options for small farmers and may be helpful in realizing Hon'ble Prime Minister's Vision Doubling Farmers' Income by 2022.

Key words: Cash crop, *Physalis peruviana*, Small farmers

GLOBALLY, almost 80% of our plant food supply comes from just 20 kinds of plants which indicates lack of diversification in the sources of food. Malnutrition, especially among the poor populations in India, is another serious concern, as most of them survive mainly on core grains like wheat and rice. To tackle such problems, diversification of food is essential, to ensure availability and access to a variety of food types to poor people. Weedy relatives of some crops are a source of food that has hitherto been not adequately studied. There are many 'wild' species in the world, which have colonising abilities (i.e. weedy traits) and are suitable for human consumption. Exploring the opportunities for farming such species will help in providing better nutritional quality to poor populations. The study explored the above possibilities with *Physalis*

peruviana (Capegooseberry), locally known as *Ban Tipariya*, *Panchkota*, *Chirpati* and *Rashbhari*.

Surveys were conducted for

collection of germplasm of *Physalis* species from the different locations across the agro-climatic zones. A total of 30 collections of *Physalis* (3



Fig. 1. Plants of *P. peruviana*

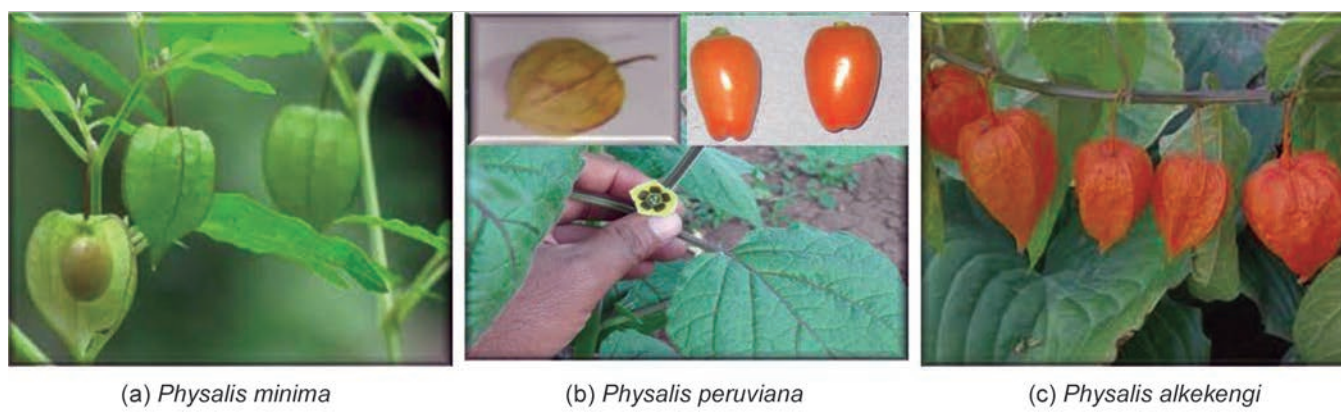


Fig. 2. Three edible species of *Physalis*

distinct species) have been collected. Fruits of all the three species are edible. Out of these three species, *Physalis minima* is a common weed in *kharif* crops (rice, soybean). Another species, *P. alkekengi* was traced only at high altitudes in tribal dominated area in Dahanu near Leh (Jammu and Kashmir). Out of the three, species only *P. peruviana* is under cultivation at small scale near metro cities of north and central India. Prevailing market rate of *Physalis*

fruits is nearly ₹ 100/kg which should be enough to create temptation among farmers for better revenue.

During surveys of farmers' field, we found that farmers are still not very satisfied. Based on the input from farmers, we identified three main constraints:

- Non-availability of quality germplasm;
- duration of the crops is longer which extends from October to April. Sowing of the *Physalis* in

October is practically problematic as fields occupied by previous season (*kharif*) crops. Similarly, towards end of its growing season, farmers have to sacrifice spring/summer crops (mostly pulses); and

- Less demand of *Physalis* fruits in places other than metro cities due to lack of awareness among consumers.

Due to these problems, farming of *P. peruviana* could not be adopted at potential level. The study worked to

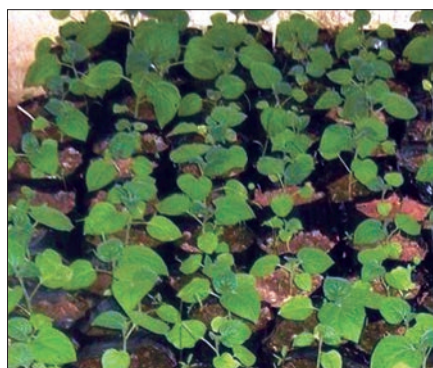


Fig. 3.a. Step I: Seedling grown in plastic bags having 1 kg soil mixed with good quality vermi-compost. (Sowing time: 10-20 September)



Fig. 3.b. Preparation of field by digging of pits (15 cm diameter and 15 cm depth).



Fig. 3.c. Step II: Transplanting of seedlings (45 days old) just after removing plastic bags without disturbing soil of the rhizosphere (First week of November).



Fig. 3.d. Growth at last week of November

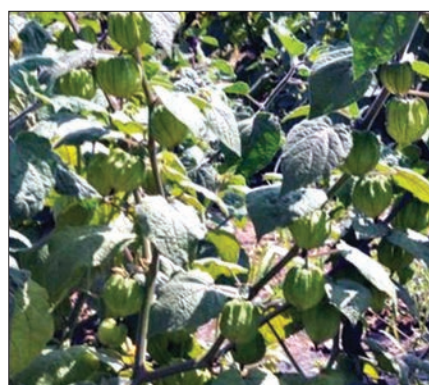


Fig. 3.e. Fruiting starts from mid December



Fig. 3.f. Maturity of fruits starts from mid January and ends by first week of March

Table 1. Proximate analysis of fruits of *P. peruviana*

	Ca (mg/ 100 g)	Mg (mg/ 100 g)	P (mg/ 100 g)	Fe (mg/ 100 g)	Vit C (mg/100 g)	β- carotene (mg/100 g)
Minimum	20.3	5.34	28.9	0.28	19.4	6.02
Maximum	28.5	10.2	32.4	1.21	50.2	13.1
Mean	25.4	7.86	30	0.56	29.3	9.01

Table 2. Optimized package of practices

Operation	Time window
Sowing of seeds in plastic bags: Plastic bags were filled with 1 kg of soil and vermi-compost mixture supplemented with DAP. As an alternate, plastic or earthen pots can be used in place of plastic bags. Initially 3-4 seeds were sown in each bag. After germination, only single healthy plant was maintained. Bags were kept in semi-shade conditions to avoid exposure to high sunlight and temperature. Water was applied as and when required. In 45 days, seedlings easily attained the 5-6 leaves stage.	Mid September
Transplanting seedlings in fields: Pits (15 cm diameter and 15 cm depth) can be prepared manually or with the help of mechanical digger. After removing of polythene, seedlings should be transplanted carefully without disturbing rhizospheric soil. By doing this, transplanting shock can easily be avoided which facilitates in speedy growth of transplanted seedlings in field conditions. A square planting spacing of 90 × 90 cm is optimum in this method.	First week of November
Fertilizers: Optimum dose of fertilizers is 80 : 40 : 20 (N:P:K) kg/ha.	• Full dose of P and K and one third of N as basal application. • Remaining N in two splits at 20 and 40 days after trans-planting by place-ment method.
Weed management: Weed management can be achieved by direct spray of glyphosate @ 1 kg/ha + after 20 days of transplanting.	• Protected spray of glyphosate: At 20 days after trans-planting (DAT) • Hand weeding: At 40 DAT (if required)
Irrigation: As and when required. Normally 3-4 irrigations are sufficient. Extra irrigation may be required in frost prone areas.	Normally at an interval of 20-30 days depending on the water availability
Picking of fruits: Fruiting in <i>Physalis</i> shows indeterminate habit. Fruits can be picked up when outer cover of the fruits become yellowish.	Mid January to first week of March
Yield potential and economic analysis	
Space required for one plant	0.81 m ²
Approximately number of plants/ ha	12,000
Potential yield of fruits/plant	1.0 kg
Realized yield of fruits/ha	100 Q/ha
Prevailing whole sale rate of fruits	₹ 4000/Q
Total gross income	₹ 400,000/ha
Total cultivation cost + marketing cost	₹ 180,000/ha (mainly during fruit picking and transportation)
Net income	₹ 220,000/ha

address these problems under a grant received from ICAR, New Delhi. A total of 30 diverse biotypes/ collections of *P. peruviana* was collected from different locations

across the agro-climatic zones and characterized for high yield and fruits quality. Fruits can be eaten as such, offer good taste and rich in minerals, vitamin C and β- carotene. Some of

the quality parameters of the fruit are given in Table 1.

The best four accessions were selected on the basis of yield potential and further studied for agronomic practices. However, the study could not find any accession which can be grown within the time window available with farmers. To tackle this problem, the study developed an innovative two-steps technology which considerably shortened the field occupancy from 6 month to 4.5 month (First week of November - mid of March).

Two steps-planting technology for *P. peruviana*

Usually, duration of the crops is longer which extends from October to April. Sowing of the *Physalis* in October is practically problematic as fields are occupied by previous season (*kharif*) crops. Similarly, towards end of its growing season, farmers have to sacrifice spring/summer crops (mostly pulses). The study addressed this problem and developed a two steps-planting technology to shorten the field occupancy. Main steps involved in this technology are outlined in Table 2.

Being rich in minerals and β-carotene, fruits of *Physalis* would help in fighting malnutrition and would add new item in food basket. By using good quality germplasm and adopting the innovative two-steps planting approach (as discussed above), farmers can achieve a net income of ₹ 220,000/ha (or even more in areas near big or metro cities) without disturbing the schedule of the flanking crops. Outreach programme was initiated to popularize the cultivation of *Physalis* which includes on-station demonstration, on-farm demonstration and facilitating visits of farmers and with scientific and technical inputs.

¹Research Scholar, ²Senior Scientist, Plant Physiology, ³Scientist, ⁴Principal Scientist, Director (Acting). Corresponding author's e mail: kumarbhmesh@yahoo.com

Authors!

Upload your article for *Indian Farming* and visit <http://epubs.icar.org.in/ejournal>