

Pusa Vilayati Palak: A highly nutritious Spinach variety

New indigenously developed spinach variety Pusa Vilayati Palak is a prickly seeded variety having completely green succulent stem and leaves. Leaves along with stem is cooked as vegetable. Male and female both plants are vegetative type with vigorous and luxuriant in growth. Leaves of this variety are smooth, soft having pointed apex with slight serration at bottom and middle of the leaf. It is short duration crop and gives 2-3 cuttings. Being a short duration crop, it can be easily fitted in rice-wheat or other cropping systems for cultivation during winter. It is rich source of fibre and other nutrients, like ascorbic acid, iron, calcium etc. It is suitable for winter season for both plain and hilly areas. It gives an average green leaf yield of 12 t/ha.

SPINACH (*Spinacia oleracea* L.) is a green leafy vegetable grown in cool season and native to central Asia. Its leaves along with succulent stems are eaten as a common edible vegetable. It is diploid having chromosome number, $2n=2\times=12$. It belongs to family Chenopodiaceae. The plant is dioecious annual in nature. The sex expression is tetramorphic (extreme male plants having smaller plant and earlier flowering, vegetative male plants with larger plants, female plants having larger size and longer vegetative period, and monoecious which are rare). The extreme male plants do not have any commercial use. In an improved variety, extreme male plants are almost eliminated. In India it is grown in the hills. It is also grown in eastern part of Uttar Pradesh in winter season. Most of the places introduced varieties are grown in our country. It is very nutritive, especially rich in fibre and store house of vitamins such as vitamin A, vitamin C, folic acid and riboflavin as well as minerals such as iron, calcium and phosphorous. It is very useful for constipation and overcoming problem of anaemia. Its leaves can be used in fresh as well as dry forms for consumption as vegetable and for preparation of *roti/ puri/ parantha* etc. with wheat flour. It can be used as a potential food crop for diversification of agriculture

to newer areas, environmental sustainability and for combating the nutritional deficiency in human being in many parts of the world. This crop does not require high inputs and can be easily grown on agriculturally marginal lands. Seeing its potential as a rich source of antioxidants and other nutrients, nutritionally rich and high yielding variety, Pusa Vilayati Palak has been developed by the Division of Vegetable Science, ICAR-Indian Agricultural Research Institute, New Delhi for cultivation during winter season. This variety has been developed by crossing Local Spinach (low yielding early bolter) and exotic variety Virginia Savoy (slow growing vigorous but sensitive to high temperature). Salient features of Spinach variety, Pusa Vilayati Palak are as follows:



Spinach Variety Pusa Vilayati Palak

are as follows:

- It is a prickly seeded variety having succulent stem and leaves.
- Plant is vigorous having completely green stem and leaves.
- Leaves are smooth, soft having pointed apex with slightly serrated margin.
- It is short duration crop suitable for 2 cuttings.
- It recorded high content of ascorbic acid, iron and calcium (65, 8 and 186 mg/100 g respectively).
- It is suitable for autumn winter season for both plain and hilly areas.
- It gives an average green leaf yield of 12 t/ha.

Table 1. Nutrient content of spinach: Pusa Vilayati Palak in respect to other major leafy vegetables.

Vegetable	Carotenoids (mg/100 g)	Antioxidant (Cuprac) μ moltrolox/gm	Beta carotene (mg/100 g)	Ascorbic acid (mg/ 100 g)	Dry matter (%)	Fe (mg/ 100 g)	Ca (mg/ 100 g)
Pusa Vilayati Palak	64	23.1	7.0	65	7.0	8	186
Local spinach	52	21.8	5.5	51	6.8	8.4	201
Virginia Savoy	75	17.8	8.0	25	7.8	8.0	169
Methi (PEB)	60.9	12.6	6.0	27.5	12	10.8	194
Amaranth (PLC)	69.4	18.6	7.0	33	9.0	11.2	271
Palak (All Green)	49.7	8.5	5.0	26	6.3	7.0	105

Package of practices of Spinach: Pusa Vilayati Palak

Climate

It is a cool season crop and tolerant to frost. At high temperature early flowering takes place.

Soil

It can be grown on a variety of soils but sandy loam or loam soils are best suited than heavier soils. It is a moderately salt tolerant and can also be grown successfully in saline-sodic soils having pH 6.5 to 7.5. The soil should be rich in nutrients and it responds well to farm yard manures.

Seed rate

20 kg seed are required for direct sowing in one-hectare land.

Seed treatment: Before sowing, seed should be treated with thiram @3 g/kg seed or *Trichoderma* @5 g/kg seed.

Sowing

It can be sown October onwards, but November is the best time for northern plain. On mid hills (850-2500 m), it can be grown in the month of September onwards, while in high hills (more than 2,500 m) April- May is the best time for sowing after melting of snow. The seed is sown in rows 30 cm apart at proper soil moisture. Plant to plant distance of 10 cm is maintained after germination by thinning extra plants. Apply pendimethalin @3 litre/500 litre of water on soil surface immediately after sowing and covering seeds.

Manure and fertilizers

A basal dose of 25-30 tonnes of farmyard manure per hectare should be incorporated in the soil at the time of preparation of land. Application of nitrogen fertilizer is the foremost requirement for leaf growth. N: P: K @ 50:50:50 kg/ha should be applied before sowing during land preparation. Nitrogen should be applied in two equal split doses also, after first and second leaf cuttings @ 30 kg urea per hectare as top-dressing after each cutting of the leaves or/and spray 1% solution of urea for quick regrowth.

Irrigation

This crop requires less irrigation. However light

irrigation should be given in 10-12 days interval.

Intercultural operation

One or two weeding or hoeing is required to keep the crop free of weeds i.e. 30 and 45 days after sowing.

Harvesting

First harvest is available 40-45 days after seed sowing. Next harvests can be taken at about 20 days afterwards and 2-3 cuttings are possible till the crop starts flowering when the leaves become unfit for consumption.

Yield

Average 12 t/ha green leaves are harvested in 2-3 cuttings.

Seed production

For seed production 20 kg seeds are sown in lines in November at a spacing of 60 cm between rows and plant to plant spacing of 10 cm is maintained within row after seed germination by thinning. Isolation distance of 1,600 m and 1,000 m for foundation and certified seed production is kept respectively to prevent contamination by cross-pollination with a different variety of same crop, and also to prevent mechanical mixing of the seed during harvest. About 20-25 tonnes of farm yard manure along with 50 kg nitrogen, 50 kg phosphorus and 50 kg potash are applied to the soil at the time of field preparation. One leaf cutting is generally taken and after that it is left for seed production. An additional dose of 20 kg nitrogen/ha should be applied after cutting for quick growth. Roguing should be done to remove off type plants at pre flowering based on colour and shape of leaves and stem, at flowering (the early bolters are removed), and at post flowering stages. Regular supervision of seed production fields by trained personnel is required. Early bolters (flowering plant) should be removed by regular visit of the field as any flowering plant is noticed. All the true males, which have few leaves should also be removed. Vegetative males and females are allowed to grow, flower and seed set. All the local/wild/off type plants or weeds should be removed before flowering from nearby fields of seed crop to prevent cross pollination as spinach is a wind pollinated crop. The seed crop should be harvested at right stage of maturity. It takes around 120 to 150 days for seed maturity from sowing. After the plant is dried,



Spinach Pusa Vilayati Palak at Divisional Research Farm, IARI, New Delhi

it is threshed by beating with sticks or by mechanical thresher. Seeds are cleaned by winnowing. Seeds must be dried properly to the safe moisture levels and packaged in moisture pervious or proof packaging. Around 6-7 q/ha seed yield can be obtained.

Plant protection

No serious insect-pest is observed in this crop. However, aphids may sometimes cause damage and spray of neem seed kernel extract (5%) or systemic insecticide

can be done whenever required. In severe condition spraying of need based pesticides can also be done.

For further information, please write to:

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– Editor