

Management

- Removal and destruction of the infected plants reduces the disease spread to some extent.
- Application of neem oil @ 0.3 per cent or NSKE 5 per cent to control white fly.

Powdery mildew (*Erysiphe polygoni*)

Symptoms

- Appearance of powdery growth on leaves, stem and other plant parts.
- The severely infected leaves will turn yellow and fall off.



Management

- Dusting of sulphur two to three times during the cropping season.
- Application of wettable sulphur @ 0.25 per cent.
- Spraying of eucalyptus leaf extract @ 10 per cent at the onset of disease and 10 days later.

Bacterial leaf blight (*Xanthomonas phaseoli*)

Symptoms

- Presence of sunken irregular red to brown spots surrounded by yellow halo.
- Several spots will coalesce and form irregular patches.
- The leaves will become yellow and fall prematurely.
- Spots will also develop on stem and pods.

Management

- Field sanitation.
- Use of disease-free seed.
- Spray of COC @ 0.3 per cent.

Harvesting and threshing

Harvesting should be done when most of the pod turns black; over maturity causes shattering losses. In varieties exhibiting synchronous maturity, harvesting should be done by the cutting entire plant at ground level when the plants show physiological maturity. If the variety does not have synchronous maturity pods have to be harvested manually as and when they mature. This is a long and labour-intensive process accounting for 25-30 per cent of the total production cost and 40-50 per cent of the labour cost. Number of pickings and duration of harvest time depends on the variety. Pod picking should be done preferably during morning or evening hours to prevent shattering losses while handling the pods.

Yield

Well managed Pahenlo dal (Black gram) crop yields 8-10 q/ha.

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Pahenlo dal (Urd bean) cultivation under organic no till condition



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Black gram (*Vigna mungo* var. *viridis* L.), is commonly known as urd bean, mash, black maple etc. is one of the important pulse crops of Sikkim. It's short duration offers opportunity in cropping systems to grow as a mixed crop, catch crop and sequential crop. Rich source of protein (24-26 per cent) meets the major share of the protein requirement of the vegetarian population in the state. Generally, farmers grow pahanlo dal during *Kharif* season after harvesting of maize without considering the drainage facility in field. Similarly, more tillage operations are given by the farmers for sowing of pahanlo dal which requires longer window period. However, no till technology makes it more farmer-friendly and saves time and input as well as produces healthy crops.

Climatic requirement

Pahanlo dal needs warm weather and cultivated both *Kharif* and in summer seasons. It is a short-day plant, but day neutral cultivars are also available for cultivation in the long days of summer. The optimum temperature for better growth ranges between 25 to 35°C but it can tolerate up to 42°C. It is a hardy and drought resistant plant, and can be grown in areas receiving moderate to low rainfall. It is very sensitive to cloudy weather and cannot tolerate frost. It is grown mostly as rainfed crop and relayed with maize in the drier areas of Sikkim. It is also grown on rice field bunds. The crop can be successfully grown in the lower and mid hills up to an elevation of 1500 meters.

Cultivation practices

Soils

Pahanlo dal is grown on a variety of soils ranging from loamy and sandy soils but the most ideal one is well-drained sandy loam soils. It can be grown on heavier soils too as a rainfed crop. The optimum soil pH is 4.7 to 7.5. It can also be grown on saline and alkali soils as it tolerates slight alkalinity. Hence, application of 200 kg/ha in rows limestone or dolomite/ha is recommended to neutralized the soil acidity.

Seedbed preparation

In no tillage, harvesting of maize should be done by leaving 30-40 cm of maize stalk above the ground with the help of sickle. Immediately after harvesting of maize weeds should be removed by scraping and/or with the use of sickle. With the help of row marker furrow for seeding of crop should be done at a spacing of 30 cm from row.



Varieties

PD-3 or any locally available Pahanlo dal

Sowing time

Immediately after harvesting of maize, pahanlo dal can be grown up to the end of August. However, optimum time of sowing is first fortnight of August.

Sowing depth and spacing

The crop should be sown at 25-30 cm row to row and 5-10 cm plant to plant spacing to maintain optimum plant population. The depth of seeding should be 3-4 cm. The crop should be sown on ridge to overcome the problem of drainage.

Seed rate and inoculation

Normally the seed rate is 20-25 kg/ha but in no till practice it should be increased by 20-25 per cent. The seed should be treated with suitable strains of *Rhizobium* and phosphorus solubilizing micro-organism (PSM) @ 20 g/kg seed. For inoculation of 10 kg seed, add 100 gram gur (jaggery) and 2 gm gum *Arabica* to 1 litre water and heat up for about half hour to prepare homogeneous mixture. Allow the solution to



cool at room temperature and then add one packet of culture to it and mix thoroughly. Rub this mixture of the culture solution on seed to get uniform thin coating all over. Dry the seed in shade for about 1 hr and sow thereafter.

Thinning

Pahanlo dal is highly susceptible for intra-species competition and lack of thinning is the most common reason for poor yields. Hence, maintenance of optimum population by thinning is required at 10-15 days after germination to maintain healthy plant.

Nutrient management

Pahanlo dal is a leguminous crop hence it requires only starter dose of nitrogen. The recommended dose of nitrogen is 20 kg/ha. Vermicompost @1.5 t/ha + 0.5 t poultry manure/ha should be applied in narrow furrows made between the rows before sowing.

Weed management

Critical crop-weed competition is 10-40 days after sowing. The extent of damage due to weeds can be as high as 80 per cent. One hand weeding done 20-25 days after sowing may effectively control the weeds.

Water management

Water-logging is one of the major challenges for establishment of the crop during the early growth stages, therefore, proper drainage should be provided to remove excess water from the field. However, if long dry spells occur, one irrigation should be given at pod initiation stage for profitable crop production.

Major diseases

Anthracnose (*Colletotrichum lindemuthianum*)

Symptoms

- The fungus attacks all parts of the plant.
- Seedling will show blighting when the seeds are infected.
- The symptom appears as circular sunken black spots with dark centre and bright red, yellow or orange margins on the leaf and pods.
- The plants will dry under severe infection.



Management

- Remove and destroy infected plant.
- Apply Bordeaux mixture (0.1 per cent) or COC (0.2 per cent) at 15 day interval.

Yellow mosaic virus

Symptoms

- Initially small yellow patches or spots alternating with green areas appear on the lamina. The young leaves are the first to show the symptoms.
- Slowly the area of yellow discolouration increases and the leaves turn completely yellow.
- Infected plants mature later and bear very few flowers and pods.
- The pods are deformed and contain shriveled, undersized seeds.
- Early infection causes death of the plant before seed set.

