

CALENDAR OF OPERATIONS FOR BLACK PEPPER CULTIVATION

Month	Operations
October - December	<p>Nursery</p> <ul style="list-style-type: none">● Mark and label selected mother plants<ul style="list-style-type: none">○ Select mother vines of only varieties which are proven to be highly productive and tolerant to biotic and abiotic stress.○ Select mother plants of the age group of 5-12 years, which give regular high yields and are free from diseases including viral diseases.● Runner shoots from selected mother vines are coiled and raised on a stake to prevent it from soil contamination and striking roots in the soil. <p>Plantation</p> <ul style="list-style-type: none">● Tie growing shoots of young vines to the standards.● Remove hanging shoots in older plants.● Undertake slash-weeding of the interspaces.● Undertake hand-weeding at the basins of the vines and mulch the basins with dry leaves.● Inspect and remove plants showing symptoms of phyllody and stunt diseases (viral).● If monsoon is prolonged, drench the basins of the vines with Potassium phosphonate 3 ml/litre @ 2-5 litre per vine, depending on the size of the bush.● In case infestation of root mealy bugs are noticed, drench chlorpyrifos 0.075% on affected vines; repeat drenching after 21 days in case the infestation persists.

	<ul style="list-style-type: none"> ● In case infestation of scale insects are noticed, spray neem oil 0.3% or neemgold 0.3% on affected vines; repeat spraying after 15 days in case the infestation persists. In case the infestation is severe, clip off severely infested branches and spray dimethoate 0.1%; repeat spray after 21 days. In case berries are available on the vine, the spray has to be given only after harvest of berries.
January - April	<p>Nursery</p> <ul style="list-style-type: none"> ● Prepare the potting mixture and put for solarization for 30 to 45 days. ● Mix the solarized potting mixture with biocontrol agents viz. <i>Trichoderma harzianum</i> or <i>T. viride</i> (1 g per kg of potting mixture), <i>Pseudomonas fluorescens</i> (Strain P1 or IISR-6) (20 g dissolve in 1 liter – 50 ml per kg of potting mixture), VAM (AMF) (100 cc per kg of potting mixture) and <i>Pochonia chlamydosporia</i> (1 - 2 g / kg of nursery mixture) to prevent soil contamination. (The biocontrol agents can also be mixed with nursery mixture, even if it is not solarized). ● Fill the polybags of size 15X10 cm (with enough perforations) with treated nursery mixture. ● Separate the runner shoots from the mother plant. Avoid using, too tender or too woody shoots. ● Cut the selected runner shoots into 2 to 3 node pieces. Leaves, if any are clipped off leaving a small portion of petiole on the stem. ● Treat the cuttings with cut ends dipped in Pseudomonous formulation (250g in 750 ml water) for 20 minutes.

	<ul style="list-style-type: none">● Plant treated cuttings @3 to 5 per bag and incubate in mist chambers for 20 days. When cuttings start sprouting, they are taken out or removed from the mist chamber. Remove unsprouted and infected cuttings, if any from the nursery.● Water the plants at the required frequency so as to maintain low temperature and high humid conditions.● Spray and drench the plants at fortnightly interval with 2% <i>Pseudomonas fluorescens</i> (Strain P1 or IISR-6).● Drench the infested bags with Chlorpyriphos 0.075%, if mealy bugs damage is noticed.● Spray with dimethoate (0.05%), if gall thrips or scale insects incidence is noticed.● Spray with 0.3% Potassium phosphonate or Metalaxyl-mancozeb 0.01% (1.25 g/litre) at fortnightly interval, if Phytophthora disease incidence is noticed.● Alternatively spray the foliage with 1% Bordeaux mixture and drench with 0.2% copper oxychloride.● Remove bags with infected cuttings to prevent spread of disease. <p>Plantation</p> <ul style="list-style-type: none">● Undertake slash-weeding of the interspace.● Undertake hand-weeding at the basins of the vines and mulch the basins with dry leaves.● Remove hanging shoots in older plants.● Cover the young vines so as to prevent drying.
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	<ul style="list-style-type: none"> ● Inspect and remove plants showing symptoms of phyllody and stunt diseases (viral). ● Harvest matured berries and process. <p>New plantation</p> <ul style="list-style-type: none"> ● During the month of April, plant live standards like Murikku (<i>Erythrina indica</i>), Karayam or Kilingil (<i>Garuga pinnata</i>), <i>Ailanthus sp.</i>, <i>Glyricidia sp.</i>, Jackfruit tree etc., suitable for trailing pepper. In high altitude areas, Dadap (<i>E. lithosperma</i>) and silver oak (<i>Grevillea robusta</i>) can be successfully used as standards for pepper. Seedlings of silver oak and jackfruit tree are to be planted 2-3 years before planting pepper. ● The spacing recommended is 3 x 3 m on plain lands. On sloppy land 2 m between plants in rows across the slope and 4 m between rows. ● Irrigate the standards till the monsoon starts.
May - July	<p>Nursery</p> <ul style="list-style-type: none"> ● Continue watering at the required frequency. ● Spray and drench the plants with <i>Pseudomonas fluorescens</i> (2%) at fortnightly interval. ● Spray with 0.3% Potassium phosphonate or Metalaxyl-mancozeb 0.01% (1.25g/litre) at fortnightly interval, if Phytophthora disease incidence is noticed. Alternatively spray the foliage with 1% Bordeaux mixture and drench with 0.2% copper oxychloride. ● Drench the infested bags with Chlorpyrifos 0.075%, if mealy bugs damage is noticed.

	<ul style="list-style-type: none">● Spray with dimethoate (0.05%), if gall thrips or scale insects incidence is noticed.● Remove bags with infected cuttings to prevent spread of disease.● Select healthy, robust rooted cuttings for replanting. <p>New Planting</p> <ul style="list-style-type: none">● Prepare pits (50 x 50 x 50 cm) on the northern side of standards, 15-30 cm away from the base of the standard. Fill the pits with a mixture of topsoil and compost or well rotten cattle manure @ 5 kg/pit mixed with biocontrol agents viz., <i>T. harzianum</i> or <i>T. viride</i> (50 g/pit) and VAM (AMF) (110 g/pit) and <i>P. chlamydosporia</i> (50 g/pit).● Plant 2-3 rooted cuttings in the pits at a distance of about 30 cm away from the standards.● Press the soil around the cuttings to form a small mound sloping outward and away from the cuttings to prevent water stagnation around the plants.● Tie and trail the growing shoots to the standards.● Provide shade to the plants if the land is exposed and if there is a dry spell. <p>Plantation</p> <p>Phytosanitation</p> <ul style="list-style-type: none">● Remove all infected or dead vines along with the root system.● Prune the runner shoots or tie back to the standards before the onset of monsoon.
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- Prune off the branches of live standards to allow better aeration and sunlight that would reduce the chances of infection.
- Provide good drainage in areas prone to water stagnation.
- Tie growing shoots of young vines to the standard.
- Undertake slash- weeding in the interspaces.

Manuring

- Undertake manuring and fertilizer application with the receipt of few pre-monsoon showers.
- Apply organic manures @ 10kg/vine (decomposed cattle manure or compost or green leaves).
- Apply neem cake @ 1 kg/vine.
- Apply lime @ 500 g / vine in alternate years.
- Apply Azospirillum (50 g/vine) and P. solubalizer (50 g / vine).

Note: Application of chemical fertilizers can be undertaken two weeks after application of both manures and biofertilizers / bio-inputs.

Chemical fertilizer application

- Apply the recommended dose of chemical fertilizer at the rate of NPK 50:50:150 g/vine/year (Urea 100 g: Rock Phosphate 250 g: MOP 300 g).
- Provide half of the dose during June (Urea-50g : Rock Phosphate-125g : MOP 150g).

	<ul style="list-style-type: none">● Apply only two-third of the dose to the two year old vines and full dose of fertilizers from 3rd year onwards.● Apply 0.25% Zinc sulphate as a foliar spray and also magnesium sulphate (150 g/vine) as soil application, in zinc deficient and magnesium deficient soil, respectively. <p>Plant protection</p> <ul style="list-style-type: none">● Undertake foliar spray with 1% Bordeaux mixture followed by soil drenching over a radius of 45-50 cm around the vines with 0.3% Potassium phosphonate (@ 2-5 litres per vine), immediately after first monsoon showers. <p style="text-align: center;">OR</p> <p>Drench the soil and spray foliage with 0.3% Potassium phosphonate (@ 2-5 litres per vine).</p> <ul style="list-style-type: none">● Undertake foliar spray with quinalphos (0.05%) or dimethoate (0.05%) to check pollu beetle or top shoot borer.● Apply first round of biocontrol agents (AMF, Trichoderma, <i>Pseudomonas fluorescens</i> and <i>Pochonia chlamydosporia</i>) along with organics.
August - September	<p>Plantation</p> <ul style="list-style-type: none">● Continue new-planting / replanting● Undertake slash - weeding● Tie growing shoots of young plants to the standards.● Prune the branches of support trees to regulate shade.● Apply balance half dose of the recommended fertilizers (Urea-50g : Rock Phosphate-125g : MOP 150g).

- Apply 5 kg of decomposed coffee manure and 1 kg neem cake per vine with the onset of north east monsoon.
- Apply second round of biocontrol agents (AMF, Trichoderma, *Pseudomonas fluorescens* and *Pochonia chlamydosporia*) along with organics.
- Apply Azospirillum (50 g/vine) and P. solubilizer (50 g/vine along with decomposed cowdung).
- Spray the foliage with 1% Bordeaux mixture.
- Drench the basin of the vines with 0.3% Potassium phosphonate at the rate of 2-5 litres/vine.

OR

Spray foliage and drench the soil with 0.3% Potassium phosphonate (@ 2-5 litres per vine).

- Undertake foliar spray with quinalphos (0.05%) or dimethoate (0.05%) or 0.6% neemgold to check pollu beetle or top shoot borer.