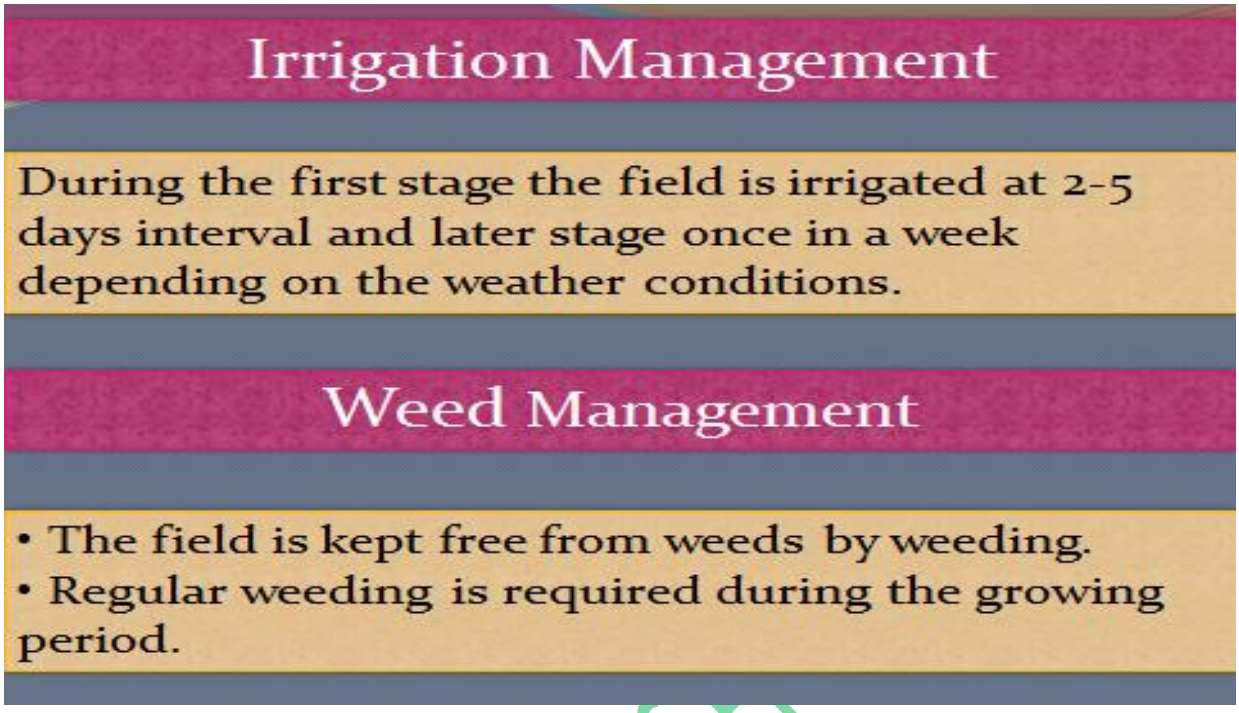


PESTS AND DISEASES

- No serious insect or disease problems have been reported.
- However, spider mites, slugs and whiteflies are to be easily controlled by using pesticides.
- Root rot may occur in poorly drained soils.
- It is reportedly susceptible to powdery mildews.

Harvesting and Yield

- The crops start to flower after 80 days of sowing.
- Flowers set fruits in nearly three to four days and the pods take nearly a month to mature.
- When the fruits turn dark colour and white opening at angles of the ridges of the pod then harvesting should be done.

- Otherwise they split and seed fall off and go waste.
- Harvested capsules are sun dried and seeds dehisce when the capsules burst.
- The oil for perfumery is extracted by steam distillation of crushed seeds.
- Seeds should be stored in dry places.
- Godowns are ideal for the storage.
- Cold storage is not good for it.
- Yield-About 750 kg/ha.

BISHOP'S WEED
(*Ammi majus*)

SUB :- MEDICINAL & AROMATIC PLANTS

(HPM 100)

Ammi majus

- **Common Name :-** Bishop's Weed, Large bull wort, Queen Anne's Lace, Bishop's Flower, Honey plant.
- **Family :-** Apiaceae or Umbelliferae

BOTANICAL DESCRIPTION

TYPE :-

Glabrous annual plant with much branched stem, erect, ridged, 30-100 cm in height.

LEAVES :-

Greenish , oblong ,6-20 cm long, alternate & pinnate . Basal leaves grow in rosette.

Plant

UMBELS :-

Flowers are white , grouped into compound umbels.

FRUITS :-

Fruits are small,brownish in colour,1.5 to 2 mm.Unriped fruits are greenish in colour.Fully riped fruits are reddish brown in colour.

CHEMICAL COMPOSITION

- Contains not less than 0.5% xanthotoxin, 0.3% imperatorin and 0.01% bergapten, determined by spectrophotometry.
- coumarins of significance are marmesin,isoimperatorin,heraclenin & isopimpinellin . Other constituents of interest are acetylated flavonoids.

MEDICINAL USES

- In Indian system of medicine, it is administered as a stomach disorders.A paste of crushed fruits is applied externally for relieving colic pains; and a hot and dry fomentation of the fruits applied on chest for asthma.

- **Uses supported by clinical data**
  - Treatment of skin disorders such as psoriasis and vitiligo (acquired leukoderma).

- **Uses described in pharmacopoeias and well established documents**
  - Treatment of vitiligo (skin disease).

Uses described in traditional medicine

* As an stimulatory substance to regulate menstruation, as a diuretic, and for treatment of leprosy, kidney stones and urinary tract infections.

CLIMATE & SOIL

- It require mild cool climate in early stages of growth. But at maturity it needs warm & dry weather.
- It can be grown on variety of soils but it prefers well drained loamy soil with good amount of organic matter.

- Ideal time for direct sowing is September.
- Seedlings can also be raised in nurseries.
- The soil is brought to fine tilth by ploughing twice.The seeds are mixed with fine soils before sowing in shallow furrows 90 cm apart.Then they are covered with fine layer of soil.
- SEED RATE :- 2.5 kg/ha.

MANURE & FERTILIZERS

- SSP :- 25 kg/ha + FYM is applied on furrows before sowing.
- After germination of seeds (7-10 days after sowing) application of 100 gm CAN / bed is recommended.
- In India :- 30 kg N/ha is recommended for maximum yield.

- Seedlings are transplanted by the end of october to november.
- SPACING :- 45*30 cm.
- Row spacing is recommended 60 to 90 cm.

INTERCULTURAL OPERATION

- 2-3 hoeings are needed to keep beds weed free.
- Irrigation is given after a week or 10 days interval during dry months.
- Water-logging should not be allowed in the field as the plants are sensitive to it.

HARVESTING

- The crop is ready to be harvested by the end of April or at the beginning of May.
- The best stage of harvesting fruits is when seeds in most of the umbel turns light brown. During this stage xanthotoxin is maximum in the fruits.
- Delay in harvesting results in loss of yield through seed shedding.

- The primary umbels are harvested first. These are hand-picked individually.
- When majority of remaining umbels are about to mature, plants should be cut at middle level & stacked in loose bundles till the fruits dry.
- Then the crop can be threshed manually.

YIELD

- Average Yield of dry seeds :- 12 Q/ha.
- Under experimental condition :- 1375 kg/ha.
- In palampur condition :- 600 kg/ha seeds & xanthotoxin content :- 1%

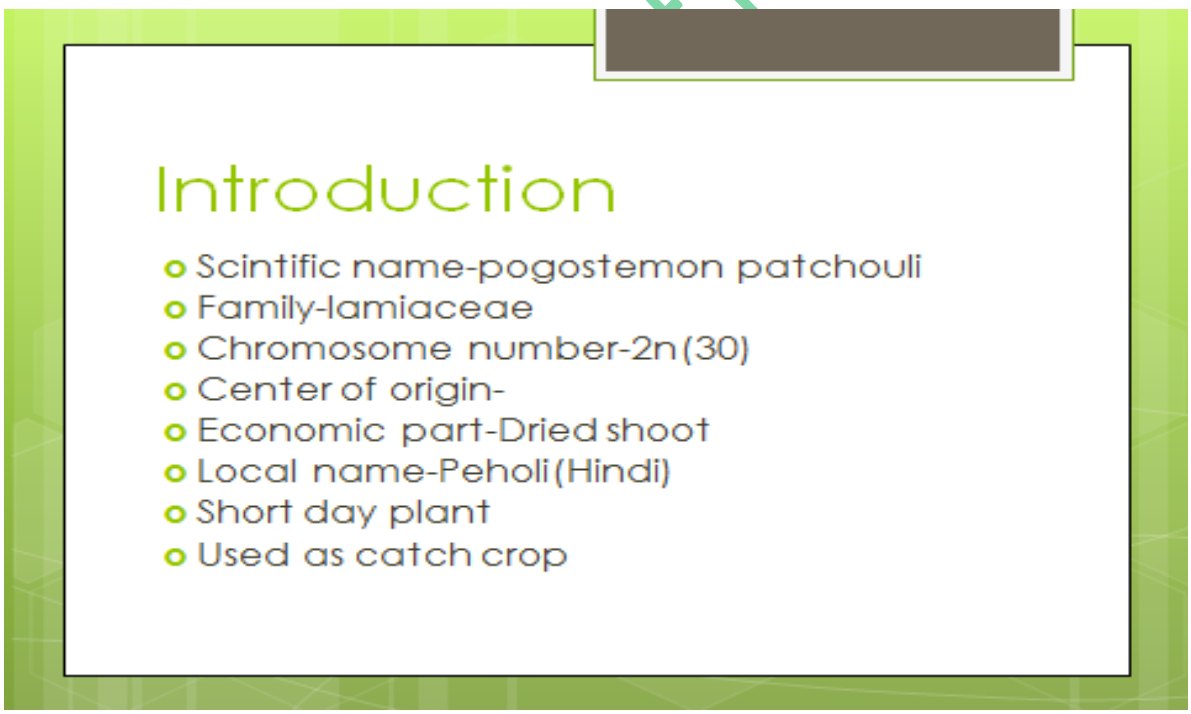
INSECT PESTS

- White ants & cut worms are reported to attack the plant which can be controlled by drenching 40 gm carbarylin in 10 liters of water.

DISEASES

- Powdery mildew & damping off are common diseases in this plant.
- For control :-30 gm wettable sulfur in 10 liters of water

& drenching with 1% bordeaux mixture also control damping off.



Plant characterstics

- Patchouli is perennial,branched,aromatic herb.

- Leaves are soft,opposite,ovate,serrate with hairs on both surface
- Stem is densely haired with swollen nodes.
- Plant grow upto 90 to 100cm.
- Flowering occour during month of feb –march
- Patchoulol is the major aromatic compound(27-35%)

Major production Areas

- Patchouli grown wild in malaysia,indonesia,singapore.
- In india it is cultivated in coastal areas of south india,west bengal,assam ,kernataka and coastal region of gujrat.

Cultivation method

1.Soil and climate

- Average temperature 25-35 degree celsius for growth and development.
- Shade loving plant
- Prefer hot and humid climate
- Prefer sandy loam soil with good drainge.
- Prefer neutral to slightly acidic soil.

Propogation

- Propagated through rooted stem cutting.
- Also propogated through tissue culture, but cost is high.
- So nursery is raised through production of rooted stem

cutting to avoid excess input loss.

Raising of nursery

- Five hundred mother plant are required for the production of 25,000-30,000 rooted cutting, sufficent for one ha area.
- Planting in nursery bed is done in the month of march-apirl.
- Stem cutting of 10-15cm length with 2,3 nodes used for production of healthy root cutting
- Cutting dipped in 1500ppm IBA for few second to enhance root production.
- Seedling is ready for transplant in 6-7week.
- Transplanting is done in the month of june-july.

Planting

- Planting is done in the month of june-march.
- Ridges and furrows at a distance of either 60cm or 90cm are preapred.
- Rooted cutting are planted at a distance of 60cm or 45cm within row.

Crop nutrition

- 150:100:100 kg of NPK per ha.
- Full dose of p & k & one by fourth of nitrogen is applied as basal.
- Nitrogen are apllied in 3 equal split doses ,one after each

harvest.

- Micronutrient mixture is to be sprayed @0.5-1% when leaves shows symptoms of cholorosis & browning.

Irrigation

- Crop is irrigated at 3-4 days intervals immediately after planting.
- 10-12 days afterwards depending upon moisture availability in soil.

Intercultural operation

- Crop require weeding at early stage of its growth.
- Nipping of shoot-Nipping of apex shoots of the plants at 20-30 days after planting is essential for furthur development of lateral shoots & uniform spread of canopy.
- Done in month of august.
- Patchauli can be grown as intercrop in partial shade of mango,custard apple & also in the plantation of rubber and coconut.

Harvesting

- First harvesting is done after 4-5months after planting.
- Further harvesting may be done at every 3-4 months interval.
- Harvesting is done by cutting the shoots of 4-5 nodes from the apex,length of the cutting ranges from 40-50cm.

- It is necessary to leave few sprouts in the basal portion of the stems for rapid regrowth of shoots.

Processing

- Harvested biomass is dried in shade for 7-10 days with frequent turning
- Leaves are packed in gunny bags when moisture level is brought down to about 6% & store in well ventilated places.
- Dreid leaves are subjected to stem distillation for extracting essential oil.
- Oil yield varies from dried leaves is 2.5-3.5%
- Yield-A good crop may be yield 10-25 tonnes per ha of fresh harbage
- 3-5 tonnes per ha per year dry herbage.
- Oil yield is about 60-100 kg per ha.

Diseases and pest

- Root knot nematode infects the crop when crop get established in the field,it can be reduce by applying organic manure in high quantity during field prepartion & application of Trichoderma spp.
- Patchouli is susccepitable to rhizoctonia wilt,to control the spread, infected plant are remove in early stage of disease.
- Generally patchouli is free from major pest ,if infestation of pest is serious then botanical pesticides is used.

AICRPOM MAP and B. 8/1/11 MAP

All-India Co-ordinated Research Project on Medicinal and Aroma Plants and Betelvine.

BETEL VINE

(Piper betle, Piperaceae)

Betel (*Piper betle Linn.*) leaf is used as a masticatory along with arecanut, lime and catechu. The probable places of origin of betel vine are India, Sri Lanka, Malaysia and Indonesia. In India it is an important commercial crop of Andhra Pradesh, occupying about 3,600 hectares. The vine is a dioecious (male and female plants are different), shade loving perennial root climber.

Botany

- Woody climber with adventitious roots at swollen nodes
- Leaf simple, alternate, cordate, 8-12 cm wide, 12-16 cm long, with Description odor and spicy taste.
- Inflorescence in axillary spike; flowers unisexual, white.
- Fruit globose berry.

Climate and Soil

Betel vine requires a tropical climate with high atmospheric humidity. It can be cultivated in the uplands as well as in wetlands. In Kerala, it is mainly cultivated in arecanut and coconut gardens as an intercrop. The crop grows best on well-drained fertile soils. Waterlogged, saline and alkali soils are unsuitable for its cultivation. The crop also comes up very well in lateritic soils. Proper shade and irrigation are essential for successful cultivation of this crop. An annual rainfall ranging from 200 to 450 cm is ideal. The crop tolerates a minimum temperature of 10°C and a maximum of 40°C. Extremely low atmospheric temperature leads to leaf fall. Hot dry winds are harmful.

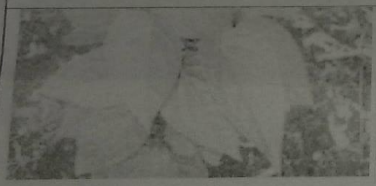
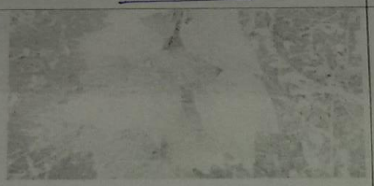
Varieties

There are about 100 varieties of betel vine in the world, of which about 40 are found in India and 30 in West Bengal. There are mainly five cultivars of betelvine viz. Desawari, Bangla, Kapoori, Meetha and Sanchi. While Kapoori and Sanchi are the principal cultivars in the peninsular India, Bangla and Deswari are common in North India. Cv. Meetha is grown on

2

commercial scale in West Bengal only. Betelvine is cultivated over an area of 40,000 ha in the country. It is a capital and labour intensive cash crop.

The important types grown in Tamil Nadu are Thulasi, Venmani, Arikodi, Kalkodi, Karilanchi, Karpuram, Chelanthikarpuram, Koottakkodinandan, Perumkodi, Amaravila and Pramuttan, Kallarkodi, Revesi, Karpuri, SGM 1, Vellaikodi, Pachaikodi, Sirugamani 1, Anthiyur kodi, Kanyur kodi.

Betelvine varieties Source: Betelvine Research Station, Diwthana, Akola	 Akot Kapuri	 Assam Kapuri
 Karapaku Kapuri	 Maghai	 Ghanagate Bangla

Season

November - December and January – February are optimum for cultivation

Preparation of field

The field is prepared to a fine tilth and beds of 2 m wide are formed to a convenient length. Provide drainage trenches of 0.5 m width by 0.5 m depth in between two adjoining beds. Plant the seeds of the live supports i.e. Agathi (*Sesbania grandiflora*) in long rows. About 750 banana suckers are planted at the edges of the beds, which are used, for tying the vines on the live support and for packing the betel leaf. When the Agathi plants reach 4 m height, they are topped off for maintaining the height. The crop is planted in two rows in beds of 180 cm width on Agathi plants with a spacing of 45 cm between plants in the row.

Irrigation

Irrigate the field immediately after planting and afterwards once in a week.

After cultivation

Training of the live standards

Before the establishment of vines, the side branches of Agathi trees up to a height of 2 m are removed for early creeping of the vines.

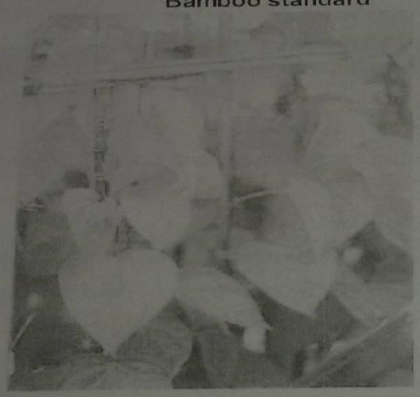
Trailing of the vines

The cuttings sprout and creep in about a month. At this time, they must be trailed on the standards. Training is done by fixing the vine at intervals of 15 to 20 cm along the live standards loosely with the help of banana fibre. Training is done at every 15 - 20 days interval depending upon the growth of vines.

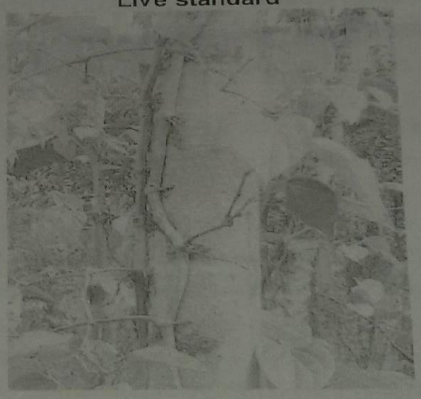
Instead of live standards sometimes bamboo standards are erected at intervals and linked by tying at heights of 30 cm and 150 cm using coir rope. In the initial stages trailing is done on coir tied for the purpose. Trailing is done further by tying the vines, at intervals of 15-20 cm along the standards loosely with the help of banana fibre.

When vines come in contact with standards, they produce adventitious roots using which they cling to support. Trailing is done every 15-20 days depending on the growth of vines.

Bamboo standard



Live standard



Lowering of vines

Under normal cultivation, the vines grow to height of 3 m in one year period. When they reach this height their vigour to produce normal size leaf are reduced and they need rejuvenation by lowering during March - April. After the vine is lowered, the tillers spring up from

the nodes at the bends of the coiled vines at the ground level and produce many primary vines Irrigation should be given after each lowering.

Manuring

Apply 150 kg N/ha/year through Neem cake (75 kg N) and Urea (75 kg N) and 100 kg P_2O_5 through Super phosphate and 30 kg Muriate of potash in three split doses first at 15 days after lifting the vines and second and third dose at 40 – 45 days intervals. Apply on beds shade dried neem leaf or *Calotropis* leaves at 2 t/ha and cover it with mud (2 t in 2 split doses).

Time of application	Nutrients (kg/ha)		
	N	P	K
Basal dressing	37.5	100	50
Top dressing @ 3 split doses	112.5	0	0

Pests

Scale insects

Select scale-free seed vines. Spray Chlorpyriphos 20 EC 2 ml/lit when one or two scales are noticed on the basal portion of the stem/leaves. Direct the spray solution to the basal portion of the vines. Spray NSKE 5 % or Malathion 50 EC 1 ml/lit.

Mites

Mites can be controlled by spraying Wettable sulphur 50 WP @ 1 g/lit or Dicofol 18.5 EC 0.5 ml/lit.

Sooty mould (Aphids)

To control aphids spray Chlorpyriphos at 2 ml/lit on Agathi leaves. Clip off excess Agathi leaves.

Mealy bugs

Mealy bugs can be controlled by spraying Chlorpyriphos 20 EC at 2 ml/lit or Dimethoate 30 EC 2ml/lit. Concentrate the spray towards the collar region.

Nematode

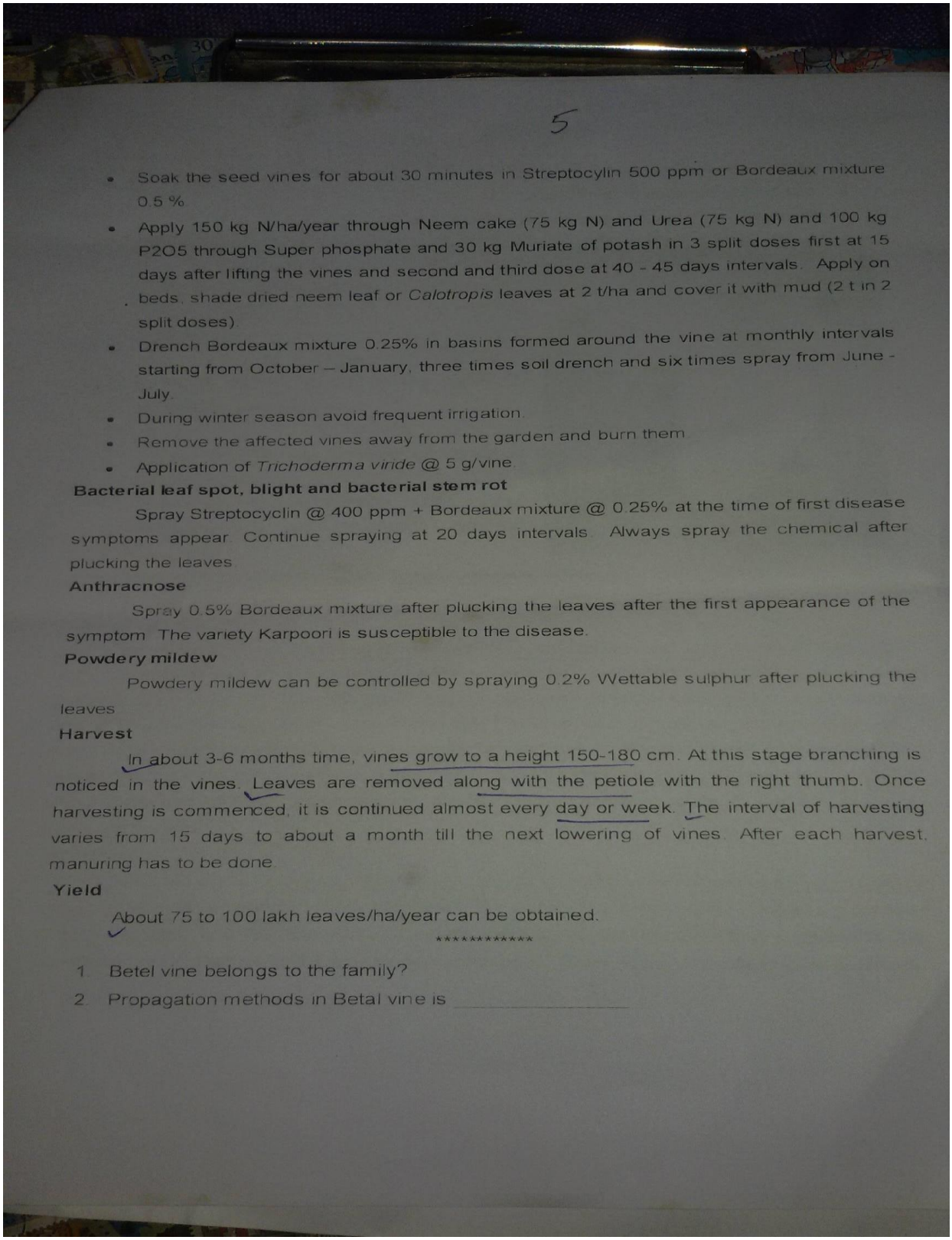
Application of Neem cake at 1 t/ha or shade dried *Calotropis* leaves @ 2.5 t/ha can be applied to soil for controlling the nematode populations.

Diseases

***Phytophthora* Wilt**

Integrated disease management of *Phytophthora* wilt

- Select well matured (more than 1 year old) seed vines free from pest and diseases.



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- Soak the seed vines for about 30 minutes in Streptocylin 500 ppm or Bordeaux mixture 0.5 %
- Apply 150 kg N/ha/year through Neem cake (75 kg N) and Urea (75 kg N) and 100 kg P2O5 through Super phosphate and 30 kg Muriate of potash in 3 split doses first at 15 days after lifting the vines and second and third dose at 40 - 45 days intervals. Apply on beds, shade dried neem leaf or *Calotropis* leaves at 2 t/ha and cover it with mud (2 t in 2 split doses).
- Drench Bordeaux mixture 0.25% in basins formed around the vine at monthly intervals starting from October – January, three times soil drench and six times spray from June - July.
- During winter season avoid frequent irrigation.
- Remove the affected vines away from the garden and burn them.
- Application of *Trichoderma viride* @ 5 g/vine.

Bacterial leaf spot, blight and bacterial stem rot

Spray Streptocyclin @ 400 ppm + Bordeaux mixture @ 0.25% at the time of first disease symptoms appear. Continue spraying at 20 days intervals. Always spray the chemical after plucking the leaves.

Anthracnose

Spray 0.5% Bordeaux mixture after plucking the leaves after the first appearance of the symptom. The variety Karpoori is susceptible to the disease.

Powdery mildew

Powdery mildew can be controlled by spraying 0.2% Wettable sulphur after plucking the leaves.

Harvest

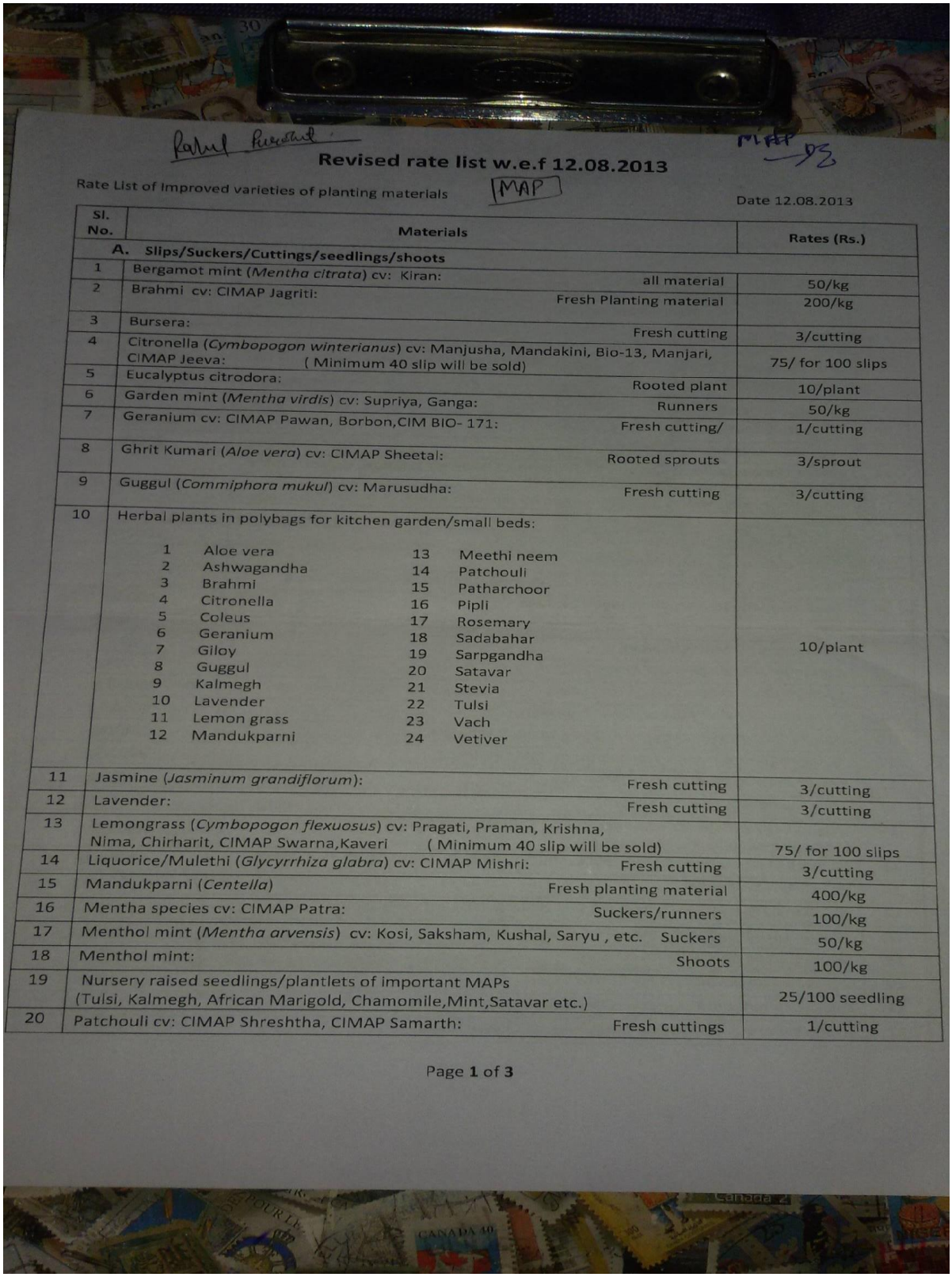
In about 3-6 months time, vines grow to a height 150-180 cm. At this stage branching is noticed in the vines. Leaves are removed along with the petiole with the right thumb. Once harvesting is commenced, it is continued almost every day or week. The interval of harvesting varies from 15 days to about a month till the next lowering of vines. After each harvest, manuring has to be done.

Yield

About 75 to 100 lakh leaves/ha/year can be obtained.

****

1. Betel vine belongs to the family?
2. Propagation methods in Betal vine is _____



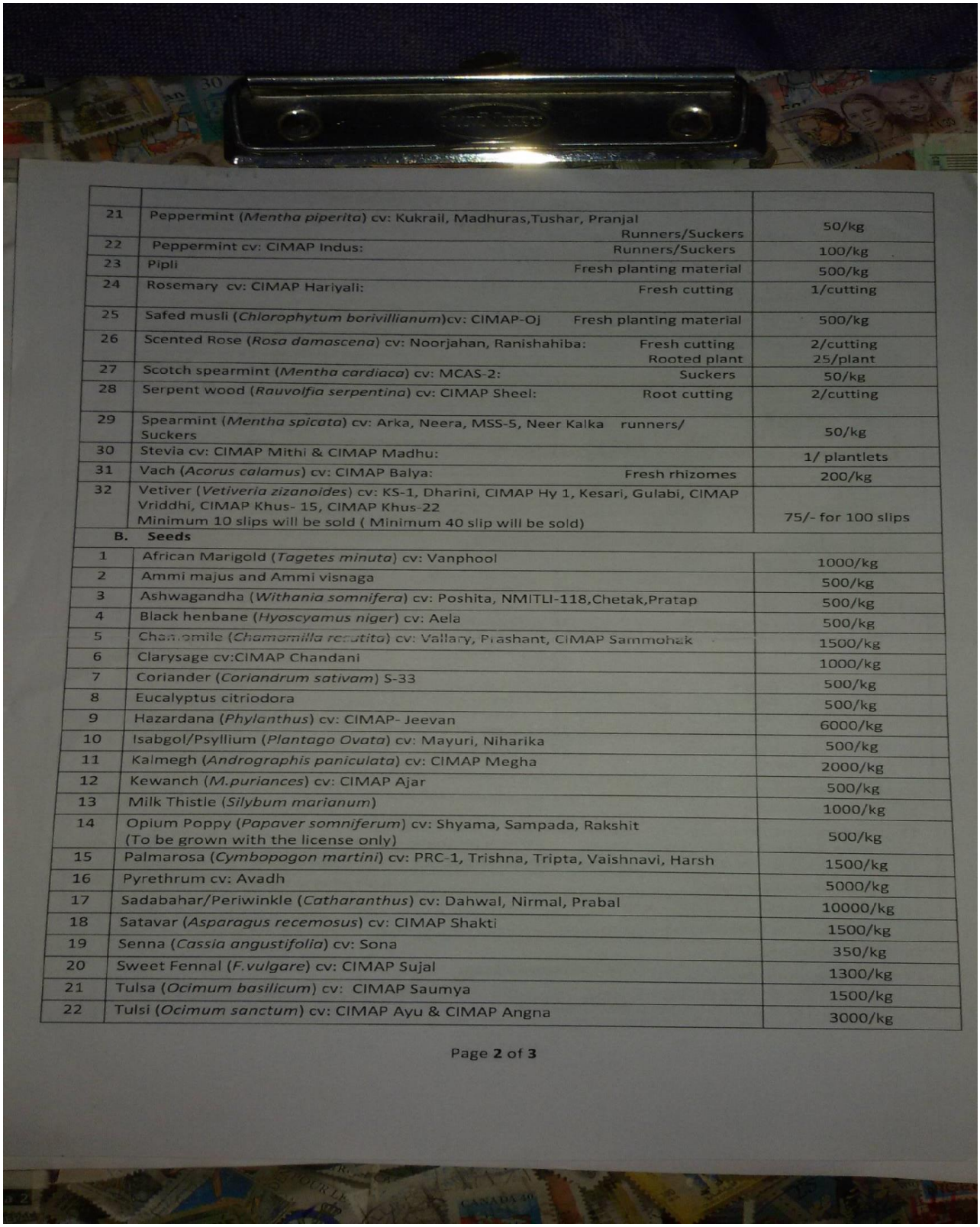
Revised rate list w.e.f 12.08.2013

Rate List of Improved varieties of planting materials MAP

Date 12.08.2013

Sl. No.	Materials	Rates (Rs.)
	A. Slips/Suckers/Cuttings/seedlings/shoots	
1	Bergamot mint (*Mentha citrata*) cv: Kiran: all material	50/kg
2	Brahmi cv: CIMAP Jagriti: Fresh Planting material	200/kg
3	Bursera: Fresh cutting	3/cutting
4	Citronella (*Cymbopogon winterianus*) cv: Manjusha, Mandakini, Bio-13, Manjari, CIMAP Jeeva: (Minimum 40 slip will be sold)	75/ for 100 slips
5	Eucalyptus citrodora: Rooted plant	10/plant
6	Garden mint (*Mentha virdis*) cv: Supriya, Ganga: Runners	50/kg
7	Geranium cv: CIMAP Pawan, Borbon,CIM BIO- 171: Fresh cutting/	1/cutting
8	Ghrit Kumari (*Aloe vera*) cv: CIMAP Sheetal: Rooted sprouts	3/sprout
9	Guggul (*Commiphora mukul*) cv: Marusudha: Fresh cutting	3/cutting
10	Herbal plants in polybags for kitchen garden/small beds: 1 Aloe vera, 2 Ashwagandha, 3 Brahmi, 4 Citronella, 5 Coleus, 6 Geranium, 7 Giloy, 8 Guggul, 9 Kalmegh, 10 Lavender, 11 Lemon grass, 12 Mandukparni, 13 Meethi neem, 14 Patchouli, 15 Patharchoor, 16 Pipli, 17 Rosemary, 18 Sadabahar, 19 Sarpgandha, 20 Satavar, 21 Stevia, 22 Tulsi, 23 Vach, 24 Vetiver	10/plant
11	Jasmine (*Jasminum grandiflorum*): Fresh cutting	3/cutting
12	Lavender: Fresh cutting	3/cutting
13	Lemongrass (*Cymbopogon flexuosus*) cv: Pragati, Praman, Krishna, Nima, Chirharit, CIMAP Swarna,Kaveri (Minimum 40 slip will be sold)	75/ for 100 slips
14	Liquorice/Mulethi (*Glycyrrhiza glabra*) cv: CIMAP Mishri: Fresh cutting	3/cutting
15	Mandukparni (*Centella*) Fresh planting material	400/kg
16	Mentha species cv: CIMAP Patra: Suckers/runners	100/kg
17	Menthol mint (*Mentha arvensis*) cv: Kosi, Saksham, Kushal, Saryu , etc. Suckers	50/kg
18	Menthol mint: Shoots	100/kg
19	Nursery raised seedlings/plantlets of important MAPs (Tulsi, Kalmegh, African Marigold, Chamomile,Mint,Satavar etc.)	25/100 seedling
20	Patchouli cv: CIMAP Shreshtha, CIMAP Samarth: Fresh cuttings	1/cutting

Page **1** of **3**



21	Peppermint (*Mentha piperita*) cv: Kukrail, Madhuras,Tushar, Pranjal	Runners/Suckers	50/kg
22	Peppermint cv: CIMAP Indus:	Runners/Suckers	100/kg
23	Pipli	Fresh planting material	500/kg
24	Rosemary cv: CIMAP Hariyali:	Fresh cutting	1/cutting
25	Safed musli (*Chlorophytum borivillianum*)cv: CIMAP-Oj	Fresh planting material	500/kg
26	Scented Rose (*Rosa damascena*) cv: Noorjahan, Ranishahiba:	Fresh cutting Rooted plant	2/cutting 25/plant
27	Scotch spearmint (*Mentha cardiaca*) cv: MCAS-2:	Suckers	50/kg
28	Serpent wood (*Rauvolfia serpentina*) cv: CIMAP Sheel:	Root cutting	2/cutting
29	Spearmint (*Mentha spicata*) cv: Arka, Neera, MSS-5, Neer Kalka Suckers	runners/	50/kg
30	Stevia cv: CIMAP Mithi & CIMAP Madhu:		1/ plantlets
31	Vach (*Acorus calamus*) cv: CIMAP Balya:	Fresh rhizomes	200/kg
32	Vetiver (*Vetiveria zizanoides*) cv: KS-1, Dharini, CIMAP Hy 1, Kesari, Gulabi, CIMAP Vriddhi, CIMAP Khus- 15, CIMAP Khus-22 Minimum 10 slips will be sold (Minimum 40 slip will be sold)		75/- for 100 slips
B.	**Seeds**		
1	African Marigold (*Tagetes minuta*) cv: Vanphool		1000/kg
2	Ammi majus and Ammi visnaga		500/kg
3	Ashwagandha (*Withania somnifera*) cv: Poshita, NMITLI-118,Chetak,Pratap		500/kg
4	Black henbane (*Hyoscyamus niger*) cv: Aela		500/kg
5	Chamomile (*Chamomilla recutita*) cv: Vallary, Prashant, CIMAP Sammohak		1500/kg
6	Clarysage cv:CIMAP Chandani		1000/kg
7	Coriander (*Coriandrum sativam*) S-33		500/kg
8	Eucalyptus citriodora		500/kg
9	Hazardana (*Phylanthus*) cv: CIMAP- Jeevan		6000/kg
10	Isabgol/Psyllium (*Plantago Ovata*) cv: Mayuri, Niharika		500/kg
11	Kalmegh (*Andrographis paniculata*) cv: CIMAP Megha		2000/kg
12	Kewanch (*M.puriances*) cv: CIMAP Ajar		500/kg
13	Milk Thistle (*Silybum marianum*)		1000/kg
14	Opium Poppy (*Papaver somniferum*) cv: Shyama, Sampada, Rakshit (To be grown with the license only)		500/kg
15	Palmarosa (*Cymbopogon martini*) cv: PRC-1, Trishna, Tripta, Vaishnavi, Harsh		1500/kg
16	Pyrethrum cv: Avadh		5000/kg
17	Sadabahar/Periwinkle (*Catharanthus*) cv: Dahwal, Nirmal, Prabal		10000/kg
18	Satavar (*Asparagus recemosus*) cv: CIMAP Shakti		1500/kg
19	Senna (*Cassia angustifolia*) cv: Sona		350/kg
20	Sweet Fennal (*F.vulgare*) cv: CIMAP Sujal		1300/kg
21	Tulsa (*Ocimum basilicum*) cv: CIMAP Saumya		1500/kg
22	Tulsi (*Ocimum sanctum*) cv: CIMAP Ayu & CIMAP Angna		3000/kg

Page **2** of **3**

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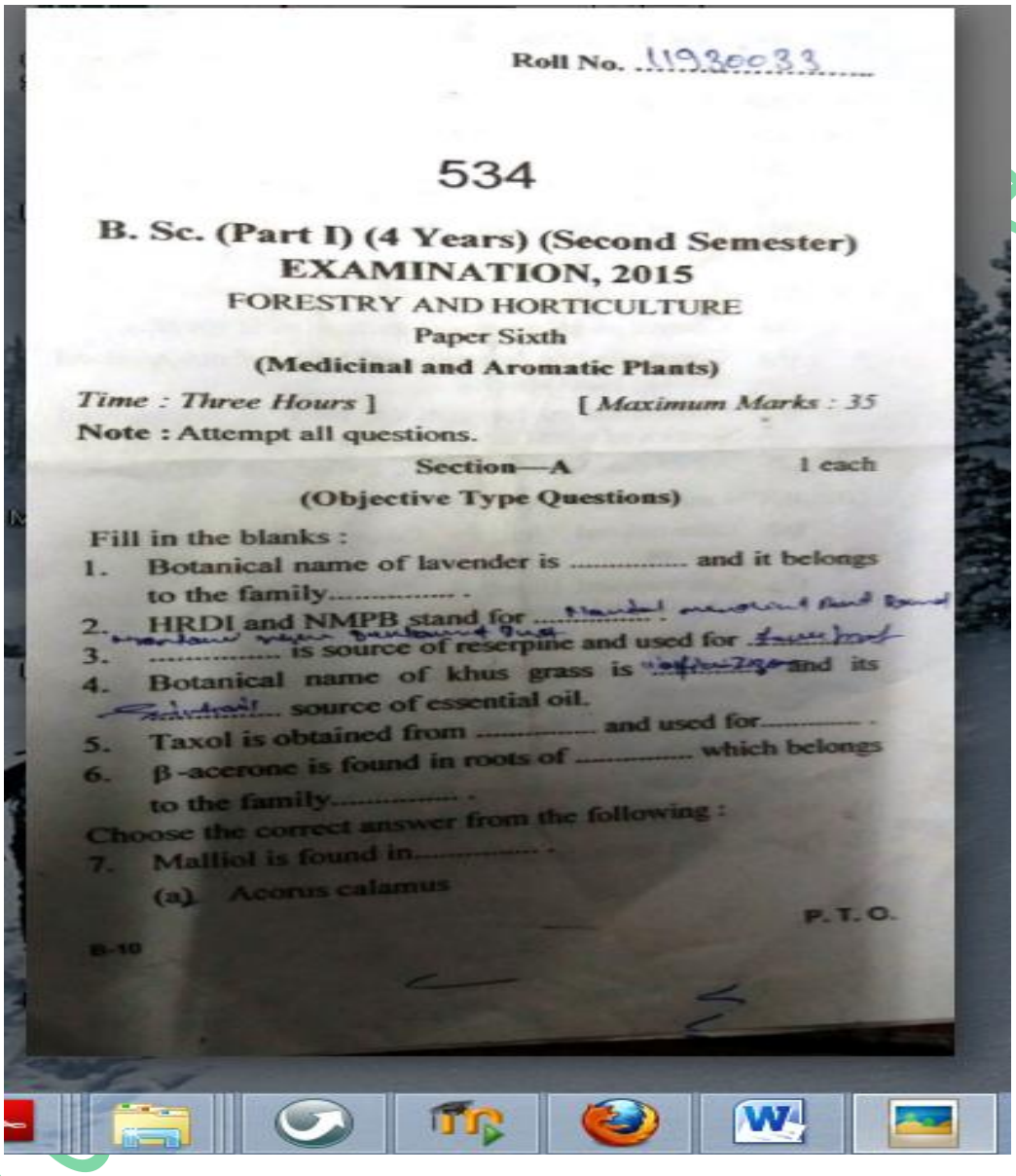

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B. Sc. (Part I) (4 Years) (Second Semester)
EXAMINATION, 2015
FORESTRY AND HORTICULTURE
Paper Sixth
(Medicinal and Aromatic Plants)

Time : Three Hours] *[Maximum Marks : 35*

Note : Attempt all questions.

Section—A 1 each

(Objective Type Questions)

Fill in the blanks :

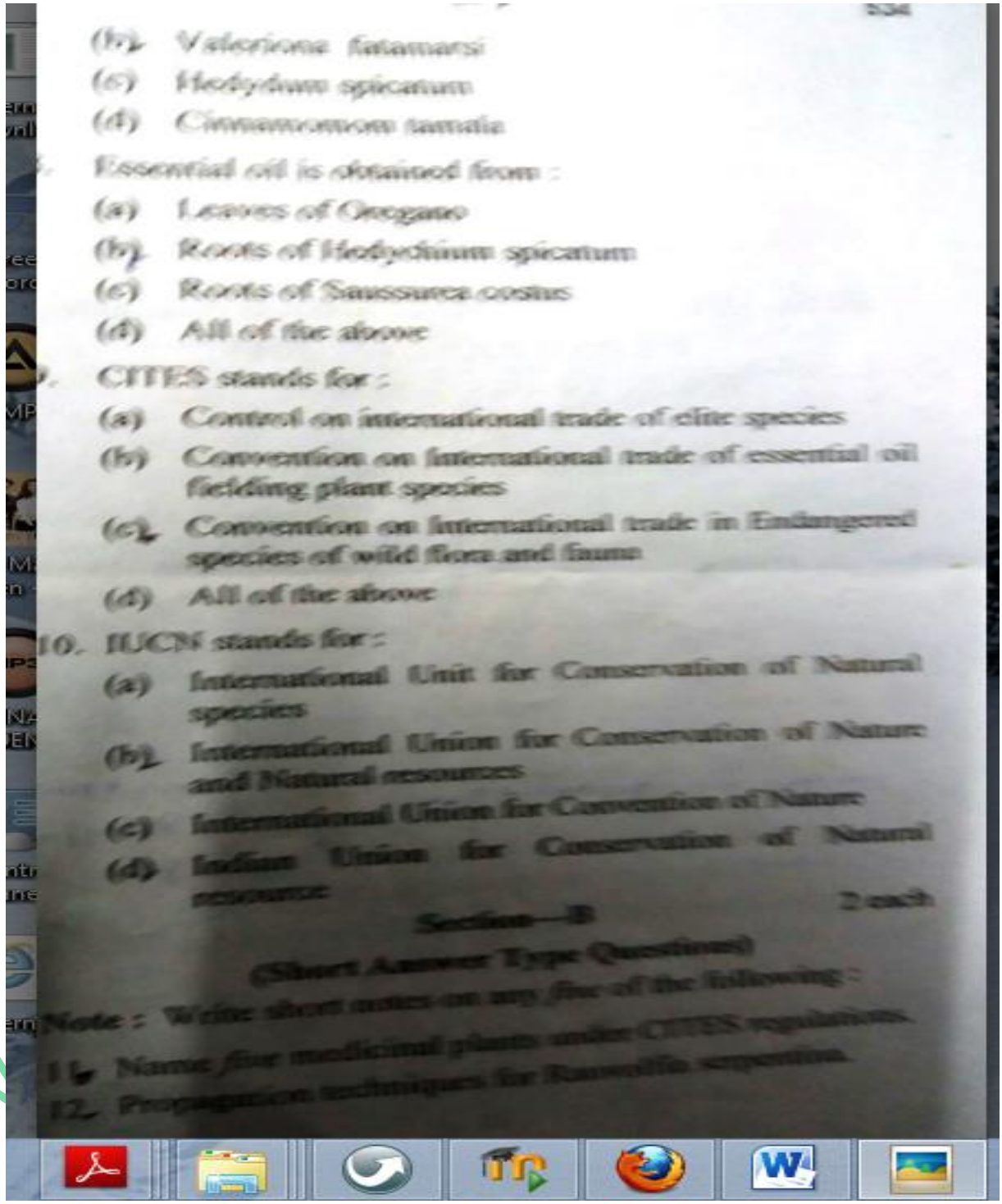
1. Botanical name of lavender is ..... and it belongs to the family..... .
2. HRDI and NMPB stand for ..... .
3. ..... is source of reserpine and used for .....
4. Botanical name of khus grass is ..... and its ..... source of essential oil.
5. Taxol is obtained from ..... and used for..... .
6. β-acerone is found in roots of ..... which belongs to the family..... .

Choose the correct answer from the following :

7. Malliol is found in..... .
   (a) Acorus calamus

P. T. O.

B-10


(b) Valeriana fatamansi
(c) Hedydium spicatum
(d) Cinnamomum tamala

9. Essential oil is obtained from :
(a) Leaves of Oregano
(b) Roots of Hedychium spicatum
(c) Roots of Saussurea costus
(d) All of the above

CITES stands for :
(a) Control on international trade of elite species
(b) Convention on international trade of essential oil fielding plant species
(c) Convention on international trade in Endangered species of wild flora and fauna
(d) All of the above

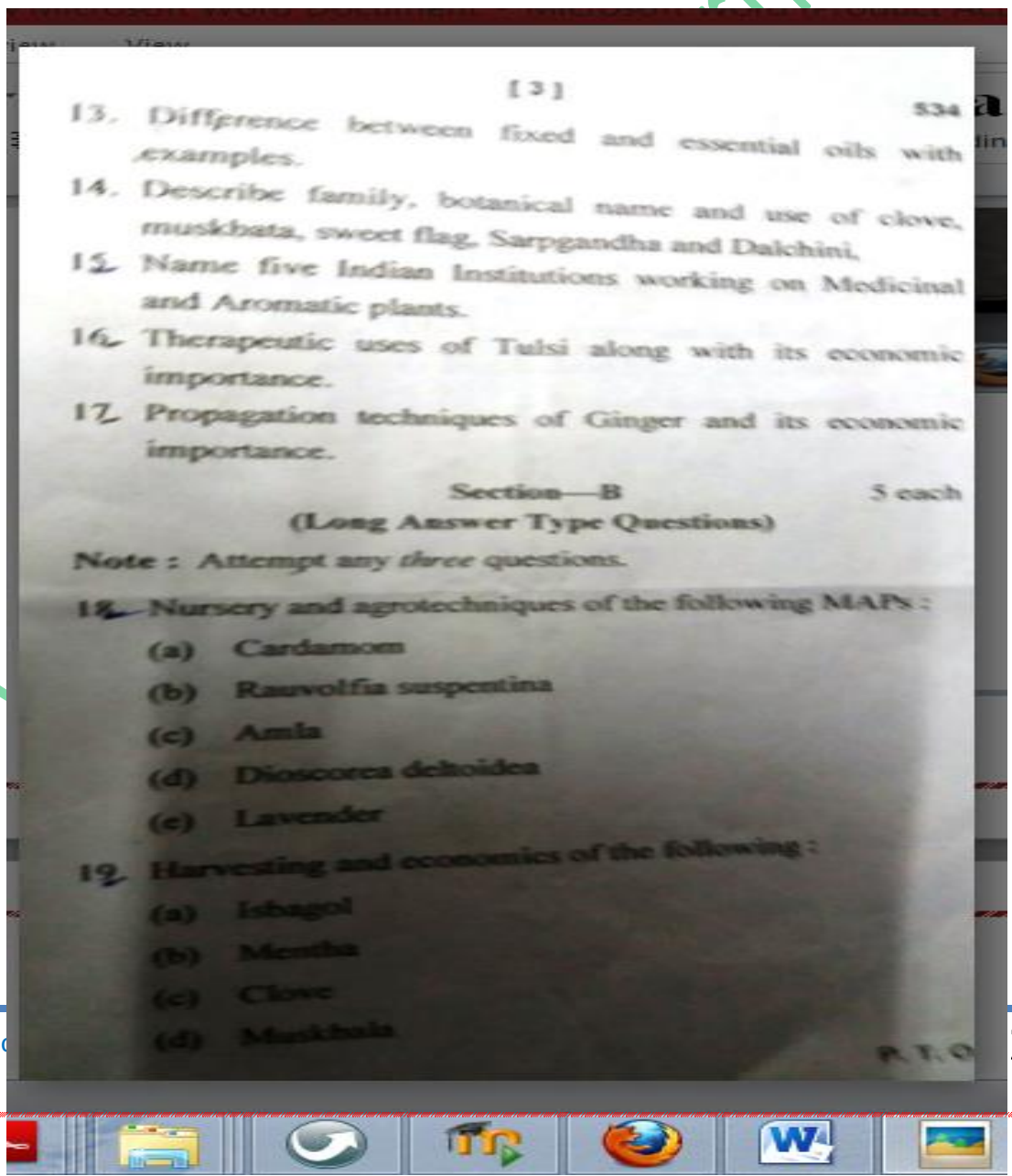
10. IUCN stands for :
(a) International Unit for Conservation of Natural species
(b) International Union for Conservation of Nature and Natural resources
(c) International Union for Convention of Nature
(d) Indian Union for Conservation of Natural resource

Section—B

(Short Answer Type Questions)

Note : Write short notes on any five of the following :

11. Name five medicinal plants under CITES regulations.
12. Propagation techniques for Rauvolfia serpentina.



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13. Difference between fixed and essential oils with examples.

14. Describe family, botanical name and use of clove, muskbata, sweet flag, Sarpgandha and Dalchini.

15. Name five Indian Institutions working on Medicinal and Aromatic plants.

16. Therapeutic uses of Tulsi along with its economic importance.

17. Propagation techniques of Ginger and its economic importance.

Section—B 5 each

(Long Answer Type Questions)

Note : Attempt any *three* questions.

18. Nursery and agrotechniques of the following MAPS :

(a) Cardamom

(b) Rauvolfia suspentina

(c) Amla

(d) Dioscorea dehoidea

(e) Lavender

19. Harvesting and economics of the following :

(a) Isbagol

(b) Mentha

(c) Clove

(d) Muskbala

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