MODEL ANSWER

MAHARASHTRA AGRICULTURAL UNIVERSITIES EXAMINATION BOARD, PUNE
SEMESTER END THEORY EXAMINATION
B.Sc. (Hons.) Agriculture

Semester	: III (New)	**Term: I**	**Academic Year:** 2023-24
Course No.	: AGRO-234	**Title**	: Crop Production Technology – I (*Kharif* crops)
Credits	: 2 (1+1)	**Time**	: 2 hrs.
Day & Date	:		**Total Marks** : 40

Note : 1. Solve **Any Eight** questions from **SECTION 'A'**.
2. All questions from **SECTION 'B'** are compulsory.
3. All questions carry equal marks.
4. Draw neat diagrams wherever necessary

SECTION "A"

Q.1 Describe in detail the cultivation of *kharif* sorghum on following points. **(4)**
1) Economic importance **2) Seeds and sowing**
3) Weed management **4) Cropping systems**

Ans: 1) Economic importance

-Sorghum grain is eaten by human beings in India either by breaking the grain and cooking in the form of '*Roti*'.
-Grains are also used eating as parched grain and 'Poped grain'.
-It is also fed to cattle, poultry and swine.
-It is also used in breweries to prepare some alcohol and malting purposes which is extracted from fermented grains.
-Nutritional point of view, Grains contain protein 10-12 %, fat 3 %,
Carbohydrate 70 %. and Minerals (mg/100gm)
Ca: 11 – 586
P: 167 – 751
Fe: 0.9 – 20.0
-Some medicines are also prepared from the grain like *Peniciline* etc.
-Chopped green stems and foliage are used to prepare hay or silage and also as pasture crop.
-Sweet sorghums are used to prepare syrups, biscuit making in bakeries.
-Sorghum seed is a good source of ethanol.

2) Seeds and Sowing:-

Selection of seed : It should be healthy with high germination percentage.
Seed treatment : 300 mesh sulphur @4g/kg of seed or carbofuran @100 g/kg of seed followed by Azatobacter + PSB @ 250 g/10 kg of seeds.
Sowing time : Onset of monsoon upto 7th July.
Sowing method : drilling.
Spacing : row to row 45cm & plant to plant 15cm

Seed rate : 7.5-10 kg/ha

Sowing depth : 3-4 cm under optimum moisture condition.

3) **Weed management.** Three Hoeing and 1-2 hand weeding are sufficient to maintain soil condition and weed growth

Chemical: If the condition of labour shortage

(a) A pre emergence application of Atrazine @ 1 kg per ha in 700 litres of water for effective control.

(b) 2,4-D @ 0.75-1.0 kg /ha as post emergence application at 20-25 days after sowing for broad leaved weeds.

Striga: It is a root parasite weed associated with Sorghum. .

Striga can be controlled by systematic removal before it flowers. Spraying with chemical weed killer 2,4-D can control striga. Some other measures to control striga are 1.Deep ploughing 2.Double the recommended dose of N 3.Growing striga resistant varieties 4.Growing catch crops and trap crops like cotton, redgram, groundnut, linseed, sunflower and cowpea. 5. Use of methyl bromide @ 200 kg / ha as a fumigant, which is costly 7. Adopt crop rotation.

4) **Cropping systems:** For intercrop Sorghum+Pigeon pea, Sorghum+Green gram, sorghum + Black gram, Sorghum+Soybean etc.

For Sequence crop Sorghum-Gram, Sorghum-Pea,Sorghum-Lentil, Sorghum- Safflower etc.

Q.2 Explain in detail the cultivation of soybean on following points. **(4)**

1) Seeds and sowing **2) Varieties**

3) Fertilizer management **4) Harvesting and yield**

Ans: 1) Seeds and sowing

Selection of seed : It should be healthy with high germination percentage.

Seed treatment : Thiram @ 4 g/kg of seed followed by rhizobium + PSB @25 g/ kg of seeds.

Sowing time : 3rd week of June to 15th July.

Sowing method : drilling.

Spacing : 30 to 45 cm row to row and 5 to 10 cm plant to plant

Seed rate : 70 to 80 kg/ha with 80 % germination. 100 kg/ha for late sowing.

Sowing depth : 3-4 cm under optimum moisture condition.

2) Varieties: Recommended of the region.

3) Fertilizer management: Apply 5-10 tonnes of FYM/ha at seedbed preparation.

The recommended dose of fertilizer 30-60-30 kg NPK +20 kg Sulphur/ha.

Full N, P and K at sowing time by placement below the seed.

4) Harvesting and yield:

Soybean crop is harvested at physiological maturity, change in colour may be yellow, brown or black of more than 90% of pods is an appropriate indicator for harvesting of the crop. The seed have 20% moisture at this stage. the plants pulled out or cut close to ground and dried in sun for 2-3 days for threshing means reducing moisture 13-14%. While threshing and storage care should be taken that embryo is to ensured otherwise germination is lost

Yield:30-35 quintle/ha.

Q.3 Elaborate the cultivation of pigeon pea crop on the following points. (4)

1) Climate and soil **2) Seeds and sowing**

3) Water management **4) Plant protection**

Ans. 1) Climate and soil

Pigeon pea grows well in warm tropical and subtropical climate.

Temperature:-

The crop prefers moist and warm weather with temperature range of 30-35 ^{0}C during germination. During active vegetative growth needs 20-25 ^{0}C . During flowering and pod setting needs 15-18 ^{0}C and bright sunny weather. At maturity needs 35-40 ^{0}C and bright sunny weather, water logging, heavy rains, frost are harmful.

Soil: It can be grown well on a wide range of soils from sandy loam to clay loams. It grows best on fertile and well drained loamy and alluvial soils. The saline-alkaline and water logged soils are unfit for Pigeonpea

2) Seeds and sowing

Selection of seed : Use certified seeds with good germination percentage.

Seed treatment : Thirum 2-3 g/kg of seed or Bavistin @ 1 g/kg of seed followed by *rhizobium* +PSB @ 25 g/ kg seed.

Sowing time : June to last week of July.

Sowing method: drilling and dibbling.

Seed rate: 12-15 kg/ha for sole crop, 5-6 kg/ha for intercrop.

Spacing : 45 X 15 cm light to medium soils, 60 X 20 cm heavy soils. Now a days 90X 20, 90 X 30cm etc

Depth of sowing : 4-5 cm deep.

3) Water management:- Being a deep rooted crop it is tolerate to drought. If there is a dry spell at the time of active vegetative stage and flowering stage it should be irrigated. Irrigation at flowering and pod development stage are recommended and 33 % more yield is recorded. Critical growth stages i.e. bud initiation, flowering and pod development stage.

4) Plant protection

Pests : Pod borer, Pod fly, plume moth, hairy caterpillar, leaf hopper

Control : Undertake recommended plant protection schedule.

Diseases: Wilt : Grow resistant varieties ,seed treatment is essential and follow crop rotation etc. Phytopthora stem blight : Seed treatment is essential, Sterility mosaic : Use resistant varieties, spray of metasystox (0.5 %) to control mites as disease spread by them. Leaf spot : Apply zineb 0.2 % spray.

Q.4 Write in detail the cultivation of maize for grain purpose on following points. (4)

1) Economic importance **2) Varieties**

3) Weed management **4) Fertilizer management**

Ans:

1) Economic importance: It is mainly used as a food crop in India in the form of bread

- Green ears find a ready market in the urban areas. The grain is ground into
- flour for making bread.
- Maize is being used as a poultry and cattle feed. Stover,
- whether green or dry is fed to the cattle.

- Pop corn, which swells and pops up on rapid heating are much relished snacks consumed all over the world.
- Corn germ oil is a good for cooking media.
- Corn starch is raw material used many brews , jams ,paper lamination, textile wrap.
- It is also good for producing alcohol.
- Some of the non food uses of corn are in preparing starch based adhesive.
- Proteins are of use in pharmaceuticals textiles, in addition corn germ is used in
- the soap making industry.

2) Varieties : Recommended of the region.

3) Weed management : 1 to 2 hand weeding and 2-3 hoeings found effective for control of weeds. Use of weedicides like Atrazine@1.5 kg/ha as a pre emergence application and PoE-2,4- D for control of weeds

4) Fertilizer management Maize is a heavy feeder, it requires large quantities of nutrients. The nutrient uptake depends on soil fertility status, variety, crop growth stage, plant density and time of cultural operations.

Recommended dose of fertilizers :

150:75 :75 NPK kg/ha

Major parts of the N uptake by the crop is over by the Tasselling stage. Hence 1/3rd of N alone with full dose of P and K as basal dose is applied.

1/3rd N at knee height stage (30-35 DAS)

where as 1/3rd N at tasselling stage.

Application of organic manure FYM or Compost@5-10 t/ha. About 20 days before sowing. In Zinc deficit soils, it is advisable to apply 15-20 kg $ZnSO_4$ as basal dose.

Q.5 Write short notes

a) Cultivation methods of rice crop.

b) Economic importance of cotton crop.

Ans:

a) Cultivation methods of rice crop. **(2)**

Availability of water decides the method of cultivation of rice. There are four methods of cultivation followed in various parts of India. *Viz.* dry cultivation (upland), semi dry cultivation, wet cultivation and Japanese cultivation (intensive).

-Dry cultivation (Upland):

It is carried out in rainfed areas. Cultivation of crop depends on rainfall received and no irrigation is given. Crop is drilled with 'Tifan' at 30 cm row spacing and 60 kg/ha seed rate. A single crop is grown during *kharif* season as rainfed.

-Semi-dry cultivation:

It is followed in assured rainfall area. Initially crop is taken in dry but during later stage it is puddle or irrigated as per requirement either with well or canal irrigation. Crop sown by drilling or broadcasting of seed. 50 to 60 kg/ha seed rate is generally used for sowing the crop.

-Wet cultivation (Low land):

It is followed under submergence or puddling in low lying areas or heavy rainfall area and commonly used in khar lands of coastal areas. Sowing is done by broadcasting of sprouted

seeds. Seeds are soaked in water over night and kept in gunny bag for one day to sprout and on next day seeds are broadcasted in fields.

-Japanese method of cultivation (Intensive method):

It is followed in ample water availability areas or assured irrigation areas. The cultivation involves two steps viz. Raising seedlings on beds and transplanting in fields.

b)Economic importance of cotton crop. **(2)**

-Used as concentrate for feeding the animals.

-Oil is extracted for edible purpose and industries use.

Cotton seed oil : Till recent year cotton seed was used only for feeding as concentrate and oil was non-edible. Now cotton seed oil is used in making **'Vegetable Ghee'**. After refining it is used for human consumption as an edible oil. Cotton seed contain about 20% oil with 20% protein, 20% CHO Vitamins and minerals. Residual oil cake is used for cattle feed. Several other byproducts manufactured from cotton :

Seed oil :seed oil is used for making soap, explosive, cosmetics, rubber plastics, water proofing materials, insecticides and fungicides etc.

Hulls : Seed coat : Presently as cattle feed, in other countries hulls are used for manufacturing synthetic rubber and plastics.

Linter :linters have many uses as surgical cotton for dressing, absorbent cotton, wicks, automobiles and furniture padding, for manufacturing of special grade paper, plastic paints, explosives, cellophane, films linoleum.

Lint : Used only for textile purpose.

Straws : Used for thatching purpose, hard board, papers and fuel.

Q.6 Describe in detail the cultivation of *Bt.* cotton on following points. **(4)**

1) Seeds and sowing **2) Weed management**

3) Fertilizer management **4) Irrigation management**

Ans: 1) Seeds and sowing:

1. Selection of seed : Use recommended variety / hybrid.It should be certified with high germination percentage.

2) Seed treatment :

-Treat the seed with Bavistin @ 1.5 g/ha.

-Acid delenting :Seeds are deeped in concentrated H_2SO_4 for 2 minutes and washed with fresh water.

-Water soaking for 10-12 hours and then rubbed with fresh cowdung + ash or soil dust paste.

-Carbofuran seed treatment @ 100 g/kg seed.

3) Sowing time :

-Rainfed – onset of Mansoon i.e. 7th to 30th June or dry seeding 10 days before onset of monsoon.

-Irrigated – 15th May to 25th May.

For Vidarbha and Marathwada

4. Seed rate :

Irrigated:	American: 5-6 kg/ha	Hybrid: 2.5 to 3.0 kg/ha
Rainfed	American:15 kg/ha	Hybrid:5 kg/ha

5. Method of sowing : Drilling for varieties and Dibbling for hybrids.

6) Spacing :

-Dibbling a) Variety 60 x 30 cm b) hybrid 90x60 or 60x60 cm

-Irrigated : Heavy soil 120 x 90 cm

Medium : 90 x 90 cm

Sowing depth :

Seeding depth should be 3-5 cm in moist zone and covering of seed by soil

2) Weed management

Keep the crop weed free. 2-3 hoeings and if required 2 to 3 hand weedings should be adopted regularly. Use of weedicides pendimethalin@2 lit/ha as pre emergence application and PoE like Quzalofop ethyl for control of weeds

Earthing up : In rainfed situation, at the time of last hoeing slight earthing up operation if followed by tying a rope to the coulters of hoe will definitely give a fine support to plant.

3) Fertilizer management

For rainfed crops: 120:60:60 NPK kg/ha

For irrigated crop : 150:75:75 NPK kg/ha

For rainfed 40% split nitrogen dose with full P and K as basal. Remaining (30+30)% nitrogen dose after 30 and 60 days by ring method

For irrigated 20% split nitrogen dose with full P and K as basal. Remaining (40+40)% nitrogen dose after 30 and 60 days by ring method

Under rainfed and irrigated situation 2 % urea and DAP spray is used as foliar application at flowering / square initiation.

Use $ZnSO_4$@ 15 kg/ha + $MgSO_4$@ 5 kg/ha as soil application for overcoming the deficiency of zinc and manganese.

4) Irrigation management

If planting is to be adopted before monsoon then pre sowing irrigation is to be given and 4 to 5 days after sowing light irrigation will be required.

The peak demand for moisture of cotton is at full flowering and boll development stage i.e. 60-80 days and also at 100 to 120 days.

Stop irrigation after boll bursting starts to avoid excess vegetative growth. Maximum uptake of moisture is from first flower opening to first bursting.

Q.7 a) Importance of pulses in Indian agriculture.

b) Importance of horse gram.

Ans.: a) Importance of pulses in Indian agriculture. (2)

-Pulses are the rich source of protein in vegetarian diet.

-Pulse crops belongs to leguminoceae family hence baring the capacity to fix atmospheric nitrogen through root nodules.

-Pulses can also be taken as green manuring crop like green gram and cowpea they are the best sources of green material to add the large quantity of biomass to add nutrients in the soil.

-Pulse crops is having short duration like green gram, black gram, cowpea and can be taken as catch crops.

-Pulses can be grown as cover crop as they bears the large quantity of canopy which covers the ground and restrict the soil degradation / erosion.

-Pulses can be taken as cash crop due to more prices for their products in market.

-Pulses are also used as base material for preparation of different sweets.

-Some pulses are also used as medicine.

-Some pulses can also consume as vegetable and in table purpose.

b) Importance of horse gram. (2)

-Its grain is used for human consumption as a dal.
-as well as in preparation of rasam.
-It is also used for cattle feeding as a concentrate feed.
-It may also be used as green manure purpose.
-Generally this crop is grown when cultivator is unable to sow any other crop for want of timely rains and also grown in vacant space of citrus orchard.

Q.8 Write in brief *kharif* groundnut crop production technology. (4)

Ans.:

Varieties:- Recommended of the region.

Climate :- It is a tropical crop and requires a long and warm growing season.

Temperature :

Groundnut needs about 21 to 26.5 ^{0}C temperature for its optimum growth during its growing period with cold nights at maturity. Temperature below 20^{0}C retard its development and above 35^{0}C adversely affects its flowering. During ripening at least one month warm and dry weather is required.

Soil: Groundnut thrives well in well drained sandy and sandy loam soils, well supplied with calcium and a moderate amount of organic matter. Light coloured, loose, friable soils are preferred but it can be found growing on a wide range of soil types with some changes in tillage practices.

Rainfall : It can be grown in tracts which receive an annual well distributed rainfall of 50 to 125 cm. Once established it is fairly drought resistant and can also tolerate flooding for upto one week provided the water subsequently drains away quickly. Heavy rains, prolonged droughts and cold weather are detrimental for better growth.

Tillage: It is a deep rooted crop. Looking to pod development, deep ploughing should be avoided so as to avoid deep pod formation. One light ploughing followed by 2-3 harrowings 12-18 cm deep, loose mass is to be obtained. The land may be converted into ridges and furrows and raised bed in heavy rainfall areas. The BBF and flat bed method is also used for its planting.

Seed and sowing

Seed selection: Use recommended varieties. The seed should be certified with high germination percentage.

Seed treatment: Thirum @3-4g/kg seed followed by *Rhizobium* + PSB@ 25g/ kg seed.

Sowing time: June-July.

Sowing method: Drilling, dibbling

Spacing: Bunch varieties 30 x 15cm, semi spreading type 37.5x15 cm, spreading type 45x15cm.

Seed rate: bunch type 100 kg/ha, semi spreading 90 kg/ha and spreading 80 kg/ha.

Sowing depth: 5-7 cm covering with moist soil.

Fertilizer management

Apply 10-15 t of FYM, Apply 25:50:20 kg NPK/ha as basal dose, Apply fertilizers 5-6 cm below the seed, Apply 125 kg gypsum for development of pods and kernels. As per deficiency symptoms or soil testing apply zinc sulphate @ 25-50 kg/ha soil application or 0.02 % as foliar spray and iron sulphate and boron should be applied as per the requirement.

Interculture:

One or two hand hoeings alternated with one hand weeding at 3 and 5 weeks after sowing should be given and care should be taken that peg formation should not be disturbed. The herbicides like pre-emergence application of pendimethalin @750 ml to 1.01/ha in 800 lit of water may be used.

Earthing up should be taken simultaneously with intercultural operations to promote easy penetration of pegs in soil. Drum rolling helps to penetrate the pegs in soil.

Irrigation:

Kharif crop is grown as rained crop in most of the areas. Therefore, in *kharif* if dry spell occurs one or two protective irrigations may be given as per requirement considering following moisture sensitive growth phases. Provide well drainage and avoid water stagnation in the field.

Flowering : 30-40 DAS.

Peg formation : 40-50 DAS

Pod development : 65-70 DAS

Plant protection:

Diseases

Tikka : Follow seed treatment or spray Zineb 0.2 % on affected plants.

Collar rot : Seed treatment with thirum @ 4 g/kg seeds.

Wilt : Remove infected plants, follow crop rotations, Grow tolerant varieties.

Rust : Spray Zineb 0.2 %.

Pests

Leaf minor,Aphids,White grub

Control : Undertake recommended plant protection schedule.

Maturity signs:

Yellowing of leaves associated with shedding of older leaves is the prominent symptoms of groundnut maturity. Harvesting is done when good percentage of nuts are fully developed and fairly intact and kernel attend original colour and when shell have blackish venation at inner side.

Harvesting and yield:

Harvesting may be done by pulling plants, by spade, local plough or blade harrow or groundnut digger. By adopting above agronomical practices it will be possible to obtain about 15-20 q pods/ha and 5-7 t/ha of green fodder.

Q.9 a) Weed and fertilizer management of bajra crop.

b) Economic importance of niger crop

Ans. : a) Weed and fertilizer management of bajra crop. **(2)**

Weed management : Two to three interculturings and one hand weeding are given .However, sometimes due to unavailability of labour or soil being too wet to permit manual wedding, timely weeding becomes difficult. Under such conditions the only effective way to control weeds is the use of herbicides.

Use of herbicides :

Pre-emergence : Atrazine 0.5 kg/800 liters of water.

Post emergence : 2,4-D is effective herbicide for weed control.

Fertilizer management : Generally bajra is not manured. Hybrid needs to be manured well due to profuse tillering and capacity to absorb more nutrient and convert them into grain. So, 8 to 10 t of FYM/compost should be mixed well in soil with blade harrow.

Penning of sheep and goats is also practiced in some states i.e. Tamil Nadu, Karnataka and Andhra Pradesh.

Recommendations :

For Rainfed : 40 : 20 : 20 : NPK kg/ha. (For Light soil)

60 : 30 : 30 : NPK kg/ha. (For Medium to Heavy soil)

broad casted in standing crop of Rice about a week before its harvest. Add 8-10 t FYM before last harrowing.

Seed and sowing :

- Selection of seed : Certified, high germination %.
- Sowing season : *Kharif, Rabi* and summer
- Sowing time : 15th June to 15th July - *Kharif*
- Seed treatment : Thirum@3-4 g / kgor Bavistin@1 g/kg followed by *Rhizobium* +PSB culture @25g/kg of seed. Now a days liquid biofertilizers are available Rhizophos@100ml/10 kg of seed.
- Seed rate : 12-15 kg/ha
-Spacing: 30X10 cm for rainfed condition
30X5 cm for irrigated condition
- Sowing depth : 4-5 cm
-Sowing method: Drilling by Dufan or Tiffan.

Varieties : Recommended of the region

Interculturing : Two hoeing and one weeding are under taken to keep crop weed free or Spraying of Pendamethalin 30% @2.5-3.3 kg/ha in 750lit.of water as pre-emergence application of herbicide.

Fertilizer Management : As crop belongs to Leguminoceae, it fixes atmospheric nitrogen and hence required less amount of fertilizers which is applied as basal dose 25:50:25 kg NPK/ha is recommended dose for green gram.

Water management: For *Kharif* crop, irrigation is not required but *Rabi*& summer crop require 2- 3 irrigations. Rice fallow greengram crop is not irrigated. Critical stages: Flower initiation (35 DAS) and Pod filling stage (55 DAS). Total water requirement: 300 – 400mm . Water logging at flowering & pod filling reduce the yield upto 75% and more.

Rotation : Generally crop is sown as a sole crop in both seasons but many times it is mixed with Jowar, bajra, maize, cotton, intercropping in sugarcane.

Moong – wheat, moong – *rabi*jowar and potato- moong (Summer) are the common crop rotations followed in various parts of the country.

Plant protection : Diseases : Powdery mildew, Yellow mosaic, Anthracnose, Leaf spot, Leaf curl
Pests : Bihar hairy catterpiller, leaf hopper pod borer

Harvesting : For *kharif* crop, the harvesting is done by picking the pods. For *Rabi & Summer* crops, harvesting is done by cutting the whole plant to the base. Picking of pods as soon as pods mature. Harvesting in 2-3 pickings. Pods turn black, Grains become hard. Leaves turn yellow to brown.

Threshing and processing: The produce is cleaned and sun dried to about 12 percent moisture content and then stored. Power thresher used for threshing.

Yield : 12-15 q/ha for sole crop and 3-4 q/ha for intercrops.

50 % N and full P and K as basal.
50 % N after 3-4 weeks as top dressing.

Foliar spray of urea @ 4 % at flowering helps to improve the seed and fodder yield as well as protein content in grain.

The foliar application of $ZnSO_4$ @2-5 kg/ha increasing grain yields.

b) Economic importance of niger crop (2)

-Niger contains 32-40% oil with 18-24 % protein in the seed.
-Oil from seed is used to treat burns and in the treatment of scabies.
-Press cake from oil extraction is used for livestock feed.
- Oil is considered good for health
-Whole plants are used as a green manure in pre flowering stage.
- Niger oil is slow drying, used in food, paints, soaps and as an illuminant.
-Oil is used in cooking.
-It is used as a substitute for Olive oil.

Q.10 Prepare a leaflet on green gram cultivation. (4)
Ans:

Economic importance: Greengram is primary consumed in the form of Dal, Moong contain high quality protein , It is highly digestible pulse crop than any other pulse crop hence it can be taken by age old person, Fried moong, moong halwa is a good source of ascorbic acid, riboflavin and thiamine, Green Pods are used as vegetables, Sprouted seed is consumed as salads, Dry seed is boiled and used in soups, made into porridge with rice and wheat, It fix atmospheric 'N' and enrich soil fertility, Being a cover crop and close growing crop, it helps in reducing soil erosion and also checks weed growth, Due to its shorter duration, it can be fit well in several multiple cropping systems, It can be grown as fodder crop and green manure crop too, On an average greengram contains 24% protein,1.2% fat and 62% Carbohydrates.

Climate: Greengram is a tropical pulse crop largely grown under semi arid and subtropical environment. It is well suited for all rainfed areas with Annual rainfall of 600-750mm. It can tolerate high temperatures upto40°C, It is hardiest among all the pulses. It tolerate drought. It is grown in *kharif, rabi* and summer. It can be grown in the temperature regime of 20-40°C. It requires optimum temperature of 28-32°C. Crop is sensitive to low temperature. Critical temperature is 15°C and 10°C where as germination does not take place.

Soils: Greengram is cultivated on a wide range of soils from sandy loams to black cotton soils. In North India, the crop is cultivated on well drained loamy soils where as in South India it is cultivated on red soils. The crop does not with stand water logging. Optimum soil pH: 6.5-7.5. Saline, alkaline soils are not suitable.

Preparation of land: There is no need for a fine seed bed preparation 1 ploughings upto 20cm depth followed 2-3 cross harrowing is adequate for a *kharif* crop. Greengram is cultivated on deep soils during *Rabi* or *Kharif* fallow soils. There is no tillage for rice fallow (Relay Crop) as the seed is

SECTION 'B'

Q. 11 Fill in the blanks.

1. Botanical name of napier grass ***Pennisetum purpureum.***
2. Maize protein is called as **Zein.**
3. BSMR-853 is a variety of **Pigeonpea** crop.
4. Soybean is called as **Wonder** crop.

Q. 12 Match the Pairs

A	B
1) Marvel grass	c. *Dichanthium annulatum*
2) Cowpea	d. *Vigna unguiculata*
3) Pearl millet	a. Poor man's crop
4) Foxtail millet	b. *Setaria italica*

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