LEC .19 BER AND JAMUN - SOIL, CLIMATE, PLANTING, VARIETIES, NUTRIENT AND WATER MANAGEMENT, SPECIAL CULTURAL OPERATIONS, PHYSIOLOGICAL DISORDERS, PESTS AND DISEASES, MANAGEMENT PRACTICES

BER

Zizyphus mauritiana (Indian ber) *Zizyphus jujube* (Chinese jujub) Family: Rhamnaceae

The ber is a vigorous growing, small spreading tree with almost vine like drooping Branches. The round to oval reddish brown are having 5.4-8.0% sugar and 85-95 mg of Ascorbic acid (Vit. C) per 100g. Central Asia is supposed to be the centre of origin for ber. The tree is a host plant for rearing lac insect (Tachardia laccad). Lac insect rearing helps in the production of lac. The powder of ber roots has very many mewdicinal properties such as cure for ulcer, fever and wounds. The stem bark powder is a remedy for diarrhea.

Climatic and soil requirements:

India ber Zizyphus mauritiana is to grow in tropical and subtropical regions while, zizyphus jujube, the Chinese ber is a deciduous tree found in temperate region. Ber is an ideal fruit tree for arid and semiarid regions where copious irrigation is impossible. It can tolerate a high temperature of even 40^0C.But below freezing temperature is injurious. Since it possesses a deep tap root system, it can be grown in an extreme moisture stress and in a wide range of soil upto an infertile one which is unsuitable for major fruits and other crops. In alkaline soils with high ph (even upto 9.5) and sodic soil, five kg of gypsum has to be applied pr pit, mixed with top soil and flooding the pits one wek before planting has to be done. By such a practice, the ber plant can be established. Once it gets established. It tolerates salinity even to an extent of 21m.mhos per cm. Z.jujuba can be used even for biological reclamation of saline soils. To certain extent ber tolerates water stagnation too.

Varieties:

Kaithili:

It is a variety with straight thorns but not so pronounced. Leaves are ovate with minutely serrated margin. Fruits ovate-oblong with broadly mummillate apex, 3.37 cm long, 1.9 cm thick weighing 6.22 g. stone elliptic oblong with pointed tip and furrowed surface.

Umran:

In this variety, the trees are medium sized with bushy decumbent branches almost touching the ground. The thorn is curved. Ovate oblong leaves with prominent serrations. Fruit elliptic, 4.2 cm long and 3.2 cm thick.

Gola:

It has got spreading tree. Fdruits are almost round with flat stylar end. Skin is bright yellow, smooth and glossy, fruits come to ripening during January. Each fruit weighs 14-25g. each tree yields about 100-125kg.

Seo (Sanaur No.2):

leaves ovate to ovate oblong with obtuse base and acute apex. Fruits round resembling crab apple, stylar end round with mild depression in the centre, stem end broad, deeply grooved. Fruits light pinkish yellow with occasional specks at maturity. Selected from a place called Sanuar near Patiala in Punjab.

Seb:

It is an early variety. Fruits are golden yellow in colour and slightly oblong ie., 3.0cmx 2.5cm. it yields 90-1000 kg per tree. It acts as a good pollinizer for a number of varieties.

Banarsi:

It is a mid-season variety. Trees are 8-12 M tall. fruits globose oblong to long in shape with tapering stylar end. Unripe fruits are green in colour. After ripening they turn to golden yellow. It has performed well under Tamil Nadu condition. Yield ranges from 100-110kg/tree/year.

Chhuhara:

It is another mid-season variety with semi-tall tree having spreading branches. Fruits ovate-oblong, size 2.9 cm x2.1cm; weight 16.8g. fully matured fruits which start ripenibg will be greenish yellow in colour. After full ripening, the colour changes to chocolate brown and the skin becomes very thin and soft. The flesh will be very sweet. Fruits are suitable to be heated and made into dry fruits like dates.

Sandhura Narnaul (Sanaur No.1):

It has erect trees. Fruits are oval-oblong to longish, stylar end slightly pointed. Fruits are greenish yellow to golden yellow. Size 4.45x2.18 cm. it has thin skin. The average yield is 80 kg/tree/year.

Elaichi:

Trees spreading with fruits having the characteristic shape of cardamom hence called 'elaichi'. Fruits are small each weighing 6g with thesize of 2.05 cmx 1.88cm. the average yield is 115kg/tree/year.

Propagation, preparatory cultivation and planting:

Ber is propagated by 'T' budding or inverted 'T' budding on seedling rootstock of *Z.jujuba*, *Z. xylocarpa* and *Z. rotundifolia*. Fruits of wild species are taken; seeds are extracted and soaked in 17% salt solution to remove the ill filled ones which float. The seeds which sink are taken and soaked in con. H2SO4 for 5 minutes washed and soaked for 48 hours in cold water. Then the seeds can be sown in the poly bags (25 x 15 cm) of 300 gauge thickness. The seeds take 10-15 days for germination. Since the development tap root system is very fast in ber as well as in wild species, when the seedlings are with two leaves they are transplanted in the main field in pits of size 1x1x1 m filled with 20 kg of FYM + top soil and irrigated. The treated seeds can also be sown directly in to the pits @ 2-3 seeds per pit at a depth of 3 cm. normally the required varieties are budded *in situ* on this rootstock seedlings after 90 days.

If we want to bud the seedlings raised in polybags, large sized polybags have to be used, since the tap root grows very fast. June to august is the best period for budding for getting maximum bud-take. The scion sticks with 0.9 cm dia, about 1 year old maturity with plumpy buds should be selected to take buds. The buds will take about 7-10 days for sprouting.

Training:

For young plant, a support should be provided by bamboo stakes. In the first year, all the branches arising upto 75 cm-1M should be removed so that a straight trunk can be developed. Above this 3-5 primary branches should be developed so as to have a balanced frame work in all directions. In the second year, on each primary branch, 3-4 well distributed secondary branches ca be allowed, and during third year final frame work should be decided.

Manures and manuring:

The plant should be fertilized in the following ratio at every year.

Age	**FYM (kg/tree)**	**N**	**P**	**K**
1 Year after planting	10	125	40	75
2 year after planting	15	250	80	150
3 year after planting	20	250	120	225
4 year after planting and then onwards	25	500	160	300

The manorial dose can be split into two equal halves and applied once during June and another after pruning. The manure fertilizer mixer should be placed in trenches of 30 cm width formed at 1.0-1.2 M away from trunk.

Irrigation:

For young trees, irrigation should be done once in a work. As the trees grow older, it can restricted once in 15 to 20 days. At the time of flowering and fruiting, there should not be any moisture stress. In rainfed condition, rain water harvest can be done by forming a saucer basin giving a 0.1% slope towards the trunk of the tree from a distance of 3 M.

Interculture and pruning:

The interpace can be utilized to raise a crop like pulses such as greengram, blackgram, cowpea etc., for about 3 years. If sufficient irrigation facilities are available papaya or phalsa can be grown as inter crop for first three years.

In ber, the fruit buds are borne on current season growth in the leaf axils. Therefore the plants should be pruned every year to induce new growth to provide maximum fruit bearing area. After the harvest of fruits, the plants have to be pruned by heading back 25% of one year old shoot. If severe pruning is attempted, it will adversely affect the growth leading to poor yield. Dry, dead, diseased wood and criss-cross branches should be removed.

Plant protection:

Pests:

Fruit fly: (*Carpomyia vesuviana*)

The flies puncture the young developing fruits by inserting their ovipositor and lays eggs singly. Hatching of eggs completes in two to three days. The larvae (maggots) feed inside the fruit pulp and make small holes in the rind and come out of the fruit when fully grown. The affected fruits become misshapen and their growth is retarded.

Management:

a. Collect infested fruits and destroy them
b. Spray monocrotophos(0.04%) or Rogar 30EC(0.06%).
c. Spray with a mixture of 100 ml Malthion 50EC and one kg jaggery or sugar in 100 lit of water twice starting from September to October at 7-10 days interval (3 sprays).
d. Cultivate ber orchard soil during April-May and apply 10% BHC to destroy pupae.
e. Grow fruitfly tolerant varieties like Umran, Sanaur

2.Bark eating caterpillar: (*Inderbela quadrinotata)*

The caterpillar maks holes in the trunk while feeding. Affected trees become stunted and yield potential is reduced.

Management:

Remove frassy galleries and paint the bark with 0.05% monocrotophos 40EC.

3. Hairy caterpillar: (*Euproctis freterna*)

caterpillar feed on leaves and cause damage.

Management:

a. Dust 10% BHC.
b. Spray carbaryl at 0.15% a.i.

4. Ber beetle or leaf chafer: (*Adorentus pallers*)

Beetles feed on leaves mainly during night. The leaves become just like a sieve.

Management:

a. Spray with one kg carbaryl in 300 litres of water.

b. Use light traps.

Diseases:

Powdery mildew: (*Oidium emysiphoides*)

Affected fruits show white powdery spots which later cover whole area of fruits. The white powdery mass also spread on flowers and leaves. Later white spots turn brown and fruits drop.

Management:

Spray dinocep 0.1% at 15 days interval after fruit set preferably at pea stage.

Harvest and yield:

In ber, fruits harvested at correct stage of maturity alone will ripe properly. Aftr attainment of full size of a particular cultivar and turning of colour to yellow or golden yellow, the normal harvesting season is October-November, while in North India it varies from place to place viz., December to April. The average yild from a 10-20 year old tre would be 100-200 kg/year. If the fruits have to be stored, they can be stored at 3^0C and 85-90% for 30 to 40 days.

JAMUN

Syzygium cumini (Syn: Eugenia jambolana*) Family *: Myrtaceae

It is a tall handsome evergreen tree of tropical and subtropical regions and has its origin probably India or East Indies. It is one of the most hardy fruits and best suited for wastelands. It is drought tolerant, at the same time can tolerate water stagnation and marshlands, where other fruit crops can not be grown successfully. The wood is used as a timber in building and railway sleeper. One hundred gram of fruits contain 19.7 g carbohydrate, 0.7 g protein, 1.0 g iron, 0.02 f calcium, 0.01 g phorus 0.1 g fat and 0.9 g fibre. Besides taken as a dessert fruit, it is also used to make beverages, squash, jam, jelly and wine. Fruit syrup is used in curing diarrhea.

Climatic and soil requirements :

It is adapted to tropical and subtropical conditions requiring a dry climate during flowering and fruiting. Early rains resulting in better soil moisture will help in growth and

development and ripening of fruits. Well drained deep loam would be ideal though it can grow on a wide range of soil conditions. In the initial stages of establishment there should not be any drought. When the tree has grown sufficiently it can tolerate drought as well as flooding.

Cultivars :

In North India a cultivar known as 'Ra Jamun' with big sized fruits is being cultivated. One seedless type (with under developed ovule) was isolated at Horticultural Research Station, Periyakulam is being grown in Agricultural Research Station, Paramakudi. But the fruits are very small.

Propagation and planting :

Though it is propagated by seeds, for true to type progenies vegetative propagation is recommended. Air layering and application of 1000 ppm NAA or IBA as lanolin paste can give 80 – 90% rooting. Inarching, veneer grafting and forkert method of bedding are also used. The plants are planted at a spacing of 10-12 m in pits of 1 cubic metre size.

Pruning, manuring and irrigation :

The plants should be trained initially in such a way that the branches develop from a point 100 cm above the ground level. Only during the initial 2 – 3 years the plants require regular irrigation. In later years the irrigation is required mainly during fruit growth and ripening. Only in poor soil the plants require manuring, 20 kg of FYM at prebearing and 80 kg at bearing age per tree is recommended. When the soil is fertile the manuring and irrigation are withheld to encourage fruit bud production.

Flowering and fruiting :

The flowering starts in first week of March and continues upto April end. The pollination is done by honeybee, houseflies and wind. By natural fruit drop only 12 – 15% of flowers reach maturity. Excessive fruit drop can be reduced by two sprays of 60 ppm GA, one at full bloom and second 15 days after fruit set.

Common insect pests :

Fruit fly	*Bactrocera (Dacus) correctus*
Leaf caterpilar	*Carea angulata*
Purple winged moth	*Bombytelia delatrix*
Psyllid	*Trioza jambolanae*
Thrips	*Leeuswenia ramakrishnae*
White fly	*Dialeurodes eugeniae*

Plant protection :

Leaf eating caterpillars can be controlled by spraying dimethoate / malathion. White fly damages all parts and even fruits get wormy. Affected, dropped fruits should be collected and burnt. At the time of flowering if spraying has to be taken up only a safe insecticide to honeybees like endosulfan has to be sprayed. Leaf spot and fruit spot caused by *Glomerella* can be controller by Indofil Z. 78 (2 g/lit.)

Harvest and yield :

The seedling trees start bearing after 10 years, while the vegetatively propagated progenies come to bearing in 5- 6 years. The fully ripe fruits should be picked by hand by climbing on the trees and collecting in a bag. Since the jamun fruits are highly perishable and hardly stand only 5 days, they should be immediately sent to market. However if necessary they can be stored for 3 weeks at 90 C and 85 – 90% RH. They yield ranges from 70 – 100 kg /tree/ year.