ASPARAGUS

BOTANICAL NAME : *Asparagus officinalis* L.
CHROMOSOME NUMBER : **2N=2X=20**
COMMON NAME : **Satavari**
FAMILY : Liliaceae

INTRODUCTION

- Asparagus is an herbaceous perennial and is grown in large areas in countries like USA, Germany, Spain and France, while India‟s contribution is meager.
- The tender shoots called “spears” are used as vegetable and in preparation of soup.
- It is also eaten as salad.
- The canned and frozen spears are also used as processed foods.
- The tender shoots contain a white crystalline substance, asparagine, which is used in medicine as diuretic in cardiac dropsy and chronic gout.
- It has good potential as fresh vegetable.

ORIGIN

- Asparagus has been grown for many years.
- The Ancient Greeks and Romans relished this crop.
- It originated in Asia Minor and is a member of the lily family.
- California, Michigan, and Washington are the major producing states, but there is some commercial production in many of the northern and western states.
- Warm regions such as Northern Mexico and Southern California also grow it.
- Recent research has shown that asparagus can be grown at a profit in India too.

NUTRITIVE VALUE (per 100 g of edible portion)

Moisture (%)	91.7	Fat (g)	0.2
Thiamine (mg)	0.12	Calcium (mg)	15.8
Carbohydrates (g)	2.9	Energy (Kcal)	20
Vit. B2 (mg)	0.13	Fe (mg)	0.7
Protein (g)	1.7	Vitamin A(IU)	762
Vitamin C (mg)	25	P (mg)	46.9

CLIMATE

- Asparagus is grown in temperate and sub-tropical regions.
- Mean day temperature of 25-30oC and 15-20oC at night are ideal.

SOILS AND SOIL PREPARATION

- Well drained soils are must for successful production, and sandy soils are also preferred.
- Good drainage is important to control crown rot disease.
- Commercial plantings of asparagus should not be made in soil that is heavier than a sandy loam.
- Avoid sites which retain standing water for more than 8 hours after a heavy rain.
- The optimum pH is 6.5-7.5.

VARIETIES

- Many new asparagus varieties are now available.
- Varieties are broadly divided into two groups,

1. With green coloured spears : more popular and mainly used in fresh market
2. With white or light green coloured asparagus - mainly used for processing.

- All available male hybrids are more productive and do not produce seed which sprouts to become a weed.
- Jersey Gem, Jersey Giant and Greenwich produce superior yields in North Carolina.
- Jersey Gem has the added benefit of having tolerance to the disease *Cercospora* leaf spot.
- The increased yields of hybrids make them worth the extra seed cost.

Perfection:

- Recommended by IARI, New Delhi.

- It is an early, uniform, productive variety, delicious with high food value.
- The spears are large, green, succulent and light tipped.
- Average yield is 80-100 q/ha.

Selection-841:

- Bush type, medium, uniform plants and productive.
- The spears are 15-20 cm long, succulent, tender, green with better flavour and suitable for soup preparation.
- Yield is 90-110q green spears/ha.
- Despite these varieties, UC-72, UC-66 and Sel-831 are also grown in Kashmir, India.

SEASON/SOWING TIME

- In hills : March-May
- In plains : July-November

SEED RATE

- Asparagus can be propagated through seeds, seedlings and crowns but most commonly followed practice is through seeds only.
- It requires about 3-4 kg seed for cultivation in one hectare.

NUTRIENT MANAGEMENT

- Apply chicken manure @75-125 quintals per hectare or Farm Yard Manure@150 to 250 quintals per hectare as basal dose.
- In addition, during succeeding years, apply 80-120kg of nitrogen, 80-100kg of phosphorus and 60-80kg of potassium per hectare twice in a year.
- Make one application of N, P and K just before first appearance of spears in the spring in early March.
- Apply the same amount of fertilizer at the conclusion of the harvest season in mid-May.
- Apply the fertilizer to the top of the soil or with very shallow incorporation.

PLANTING

There are three methods of planting

a) Crown planting

- Use only certified crowns for planting as they may carry several diseases
- Plant asparagus crowns (roots plus plant buds) so that the top of the crown is 15 cm below the soil level.
- Depth of planting is critical, if planted too shallow, asparagus will produce a large number of small spears that are not commercially salable.
- If planted too deep, spears will be very large, but will be few in number.
- Plant crowns 30 cm apart in the row with the buds upright, and 150 cm between rows to have 21,750 crowns per hectare.
- Cover crowns with 5-7.5 cm of soil after planting.
- As plants grow, gradually fill in the rest of the furrow with 2.5-5 cm of soil in 3-5 cultivations, but do not completely cover plants.
- The furrow should be completely filled by July of the first year.
- Plant before the buds begins to appear in the spring.
- Both direct seeded and transplanted asparagus can be planted in single or double rows with 5 foot spacing between beds.
- Single rows should be planted on top of "W" shaped beds (Fig.15.1).
- The "W" shaped rows are formed with a wide furrow opener followed by a beds shaper.
- Double rows of direct seeded or transplanted asparagus should be planted on shelved beds.
- Transplants can also be planted on the side of an angle-shaped furrow (Fig. 15.3). The "V" shape in the middle of the row is important since it provides a place for soil washed from the side of the beds during rains.

b) Direct seeding methods

- Seeds should be placed 5 cm apart in the row, 2 to 2.5 cm deep.

- Single row seedlings require 2.5-3.4kg of seed per hectare and double row seeding require 4.5 to 6.8 kg seeds per hectare.
- Asparagus seeds germinate best at 24°C.
- Direct seeding is preferred when the soil temperature is at least 16°C.

c) Seedling transplant method

- Asparagus seedlings can be grown successfully in peat pots, plastic pots, trays, peat pellets or seedling type trays.
- Seedling growth and survival are usually better with larger cells up to 5x5 cm seedling cells.
- Most of the artificial soil media produce a good transplant.
- Good growth above the crown and good root system development require planting the seed not more than 1.25 cm deep.
- Transplanting of seedling is preferred after the threat of frost but before temperatures get above 32°C.
- Favourable conditions usually occur in April and May.

DIRECT SEEDING AND TRANSPLANTING

* Direct seeding have the following advantages over crown planting:

1. Reduced costs, mechanization of planting, freedom from disease and increased yields are few advantages of this method.
2. But these methods require more care, closer attention, irrigation and better management than crown planting.

USE OF PLANT GROWTH REGULATORS

- Abscissic acid appears to promote sink strength or encourage phloem uploading.
- Gibberellic Acid promotes growth of asparagus buds.
- Butyric Acid supports spear emergence.

IRRIGATION

- Adequate moisture should be maintained for good germination and early seedling growth.
- Do not let asparagus plants become dry while they are establishing a root system during the first two months.
- Water stress during this early stage can reduce yields.
- After the root system is established, irrigation is needed only during extreme drought.

WEED MANAGEMENT

- Weed control in asparagus production is very important.
- Timely cultivation is a critical part of any asparagus weed control program, especially during the first two years.
- The first year asparagus should be cultivated at least once in a month until September or 6 times.
- The number of cultivations may be reduced by using herbicides.
- Remove all weeds that are present after harvest.
- Use only very shallow disking (2.5 to 5 cm) to remove these weeds.
- Deeper disking will damage crowns and can drastically reduce yield.

HARVESTING

- Asparagus can be harvested on limited basis (2 to 3 weeks, or 8 spears per plant) during the first year after planting.
- Harvesting should be limited during the second year as it results in slight reduction in spear size which is as an indication of when to stop.
- It takes a long time for asparagus to develop a large root system.
- A large root system is necessary for a healthy bed of asparagus to produce for many years.
- Do not harvest too much in early years because bed life can be shortened and total yield and profit drastically reduced.
- Harvest 6 to 8 weeks during the third year of growth, generally until mid-May.
- Allow spears to reach 20 cm tall and then cut with a knife or hand snap at the soil surface.
- Spears should not be allowed to get taller than 22.5 cm.
- The decision on when to harvest is based on having an average of one harvestable size spear per foot of row.
- When temperature exceeds 27°C, it may be necessary to harvest daily.

BLANCHING

- Mounding the soil to a height of 25-30 cm over the rows is practiced to blanch the young spears and get "white asparagus" for canning.
- After harvest, the spears should be held in a cool shaded place and sprinkled with water to prevent shriveling and wilting.
- A single irrigation sprinkler over the boxes works well. Asparagus should be hydro cooled before packing.

MARKETING

- When preparing asparagus for market, spears should be uniform in length.
- Tie in bunches of 500-1000g or pack loose in a carton.
- Asparagus loses edible quality rapidly and should be cooled as soon as possible.
- After bunching, place the butts of the spears in damp peat moss or blotter paper in a crate or carton.
- Pack 6.8 or 13.6 kg in special pyramid-shaped crates.

YIELD

- Male plants give the higher total yield while female plants produce larger individual spears.
- Yield varies with varieties, region, climate, and sex form.
- On an average, 25-40 q spears are produced in one hectare

STORAGE

- Asparagus can be stored for 2-3 weeks at 95 per cent relative humidity and at 0-2oC.
- Spears stored in wet tissue paper looked fresh and firm after 13 or 16 days of storage.

DISEASES & PESTS

Crown rot and root rot

- Asparagus is affected by two *Fusarium* species.
- The first is F*usarium oxysporum* pv. *asparagi* which causes crown rot; and the second one is *Fusarium moniliforme* which causes root rot.
- The crown rot fungus is found in most soils but at very low levels.
- If asparagus crowns are planted that have crown rot they will not produce spears for more than 4 to 7 years, and this is not profitable.

Control measures

- Do not plant asparagus in soil in which asparagus has been grown in the last 5 years.
- Do not purchase crowns grown in soil where asparagus was grown in the last 5 years.
- Purchase only certified crowns, keep asparagus growing rapidly to reduce crown rot disease by following the recommended management practices.
- The root rot pathogen may be spread through asparagus seed. Make sure to treat seeds for producing crown.

Cercospora blight : (*Cercospora asparagi*)

- Symptoms include small, oval and grey to tan lesions (spots) with reddish brown borders on the needles and small branches.
- It causes the needles to fall from the mature fern.
- It can be identified by the browning of needles.
- The disease occurs when the humidity and temperature are very high.

Control measures

- An integrated approach of several cultural practices will help provide partial control.
- Schedule overhead irrigations to allow thorough drying of the foliage before nightfall, or use drip or furrow irrigation to keep foliage dry.
- Wider row spacing will increase the air movement to dry foliage and delay canopy closure.
- Rows should also be planted in a north-south direction to take advantage of prevailing southerly winds in drying foliage burning.
- Disposal of infested residue in the spring delays blight appearance by about one week.
- There are no known asparagus varieties resistant to *Cercospora* blight.

Soft rot: (*Erwinia spp.*)

- Harvested asparagus is susceptible to bacterial soft rot.

Control measures

- Management is based on avoiding injuries and immediately cooling harvested spears.
- Wash water and water used for hydrocooling should contain chlorine.

Rust: (*Puccinia asparagi*)

- It is not a common disease.
- Rust causes small brown rusty pustules on spears and fern branches.

Control measures

- The most effective way to control asparagus rust is to plant resistant varieties.

PESTS

Asparagus beetle

- Asparagus beetles and their larvae attack on spears and ferns.

Control measures

- Spray carbaryl (0.1%) to control this insect.

Army worms

- Army worms can be especially bad on young ferns.

Control measures

- These can be controlled by deltamethrin (0.0025%) or carbaryl (0.1%).

European asparagus aphid

- It can be a problem occasionally.
- The blue-green aphid forms colonies in August or September.
- When the aphid forms colonies, it causes "Christmas tree" or bonsai effect.
- The new fern becomes shortened or stunted and new needles look like they are clustered.
- The entire plant takes on a blue green colour.

Control measures

- It can be controlled with a spray of malathion (0.05 %) or oxy-demeton methyl (0.025 %).