

# Crop Profile for Asparagus in New Jersey

Prepared: November, 2003

## Production Facts

- **State rank:** New Jersey ranks 4<sup>th</sup> or 5<sup>th</sup> nationally in asparagus production.
- **New Jersey's contribution to total US production of asparagus:** about 1% **Yearly production (2):**
  - 2002 = 39,000 lbs.
  - 2001 = 26,000 lbs.
  - 2000 = 32,000 lbs.
  - 1998 = 27,000 lbs.
  - 1997 = 23,000 lbs.

**Production costs on a yearly basis:** Since asparagus is a perennial crop, the cost of establishment/acre over a 3-year period is given here. First year: \$1929; second year: \$507; third year: \$790. The *net establishment cost* over 3 years takes into account the ability to sell produce from the second and third years: \$1805. Cost of production after establishment is \$490, not including pesticide use. Depending upon yearly conditions pesticide use may run from \$16 to \$270.

**Percent of asparagus marketed as fresh:** 100% is marketed fresh

**Production Regions:** Nearly all commercial acreage of asparagus, *Asparagus officinalis* L., is grown in the southern portion of the state. The soils in this area are coastal plain, generally light soils ranging from sand to sandy loams, but areas of heavier clay and silt loam soil do exist. Elevations are low with most of the area less than 200 feet. The warmest, seasonal temperatures occur in the extreme southern part of the state with the Salem County area being the warmest.

## Cultural Practices

Asparagus is a perennial row crop that may produce for up to 30 years, however the best production years are 5 to 10 years after planting (1). The success of growing asparagus depends upon the amount of rest or dormancy the plants are able to have due to either cold or drought. For that reason, plantings in the northeast and midwest are more vigorous than those plantings in the deep south where freezing temperatures or a long duration of cold weather seldom occurs.

Asparagus requires well-drained loam or sandy-loam soils, or heavier soils where there is good drainage. A high water table, within 4 feet of the surface, is detrimental to the root system. The optimal soil pH range is 6.7 to 7.0. Asparagus does not grow well at a soil pH of less than 6.00 and at low pH levels, Fusarium crown and root rot can be a serious problem.

Prior to planting fertilizer is broadcast providing 70 lbs of nitrogen, 250 lbs of available phosphorus, and 300 lbs of available potassium. The fertilizer will be incorporated as the field is fitted for planting. To avoid disease problems, new fields should not be established in fields where asparagus has been grown before, or, where corn has been raised within the previous 3 years. Additionally, asparagus replanted into a field less than 4 years since the last asparagus crop was taken out may suffer from alleopathy with the old planting, that is, toxins secreted by older plants interfere with the establishment of new plants.

There are 3 methods of planting: direct seeding, seedling transplants, and crowns.

**Direct seeding.** This method involves sowing seeds directly into the field and then transplanting the resulting crowns the following year. This method is not recommended as it takes longer than other planting methods and more labor intensive.

**Seedling transplants.** Seeds can be sown in trays in greenhouses and after 10 to 12 weeks the seedlings are transplanted to the field. This method requires sufficient greenhouse space and sanitation within the greenhouse to produce disease free transplants. Because of the way asparagus seedlings root, trays with straight, non-foam, non-tapering cells, 2 x 2 x 3 inches need to be used. Seedlings require close temperature and fertilizer management.

When ready, transplants are set in a raised bed in a furrow. This design helps water drainage and reduces the incidence of disease. As the seedling grows, soil is brought in around the plant so that by the end of the first growing season the furrow has been filled in to about ground level. In the fall when the fern growth dies the soil is rounded up over the plant providing a slope for water run-off.

**Crowns.** Purchasing and planting 1-year-old crowns is the most convenient method for establishing a field. Crowns are planted in shallow, 6" furrows that are gradually filled in. Phosphorus fertilizer is placed at the bottom of the furrow before the crowns are placed on top of the fertilizer. This practice has demonstrated increased yields over sidedress applications of phosphorus. Only the largest crowns should be planted and if placed right-side up the new spears will emerge more rapidly.

**Spacing of crowns and transplants.** The number of plants and whether hybrid varieties are used determine row spacing. Generally, spacing is 12 to 18 inches in row and 5 to 6 feet between rows. Larger hybrids require more room.

**Selection of hybrids.** Open pollinated varieties used to be the only varieties available, but plant breeding has developed both male-female hybrids and the open pollinated varieties. Some male hybrid varieties have the additional advantage of having disease resistance for Fusarium.

**Harvesting spears.** Spears are not harvested in the year of crown planting. However, the following season spears can be harvested for a period of 2 to 4 weeks, which runs counter to popular wisdom that says another full year wait is necessary. After three years, spears can be harvested over an eight week period if plants are healthy. Harvesting is done in the morning when spears can be snapped off, giving the best quality produce. Spears with tight compact heads have the highest nutritive quality and heads where branches have started to form, ferning out, have the lowest. While cover crops are used in asparagus production in some other states, that is not the general practice in New Jersey.

## Worker Activities

Harvesting of asparagus is by hand. The length of harvesting is dependent on age of planting. Asparagus is harvested for 2 to 4 weeks the year after crown planting, and harvested for an 8 week period after 3 years growth. Spear emergence begins in May. No scouting of the crop is done at this time because growers begin harvesting on a daily schedule. There is ample opportunity for the grower to evaluate the spears during harvest and packing. Unless an urgent pest problem is found no spraying is done during harvest. Any spray material applied at this time with a reentry time or pre-harvest interval of more than 1 day would be detrimental to the grower.

The better, more progressive growers scout asparagus every 7 to 10 days after harvest when the fern growth has developed. This post-harvest scouting is not mandatory and the intervals and degree of thoroughness varies from grower to grower. Most farms have tractors with enclosed cabs which are used for the application of post-emergent pesticides, protecting the applicator from drift.

## Insect Pests

Asparagus aphid (*Myzus persicae*) – Generally a minor pest but in certain years may be very important. Aphids are 1/16 inch long and bluish green. Aphids will build up on the brush, the newly emerging ferns, in early summer after harvest. Heavily infested plants will be stunted and may be killed during the first year. **Threshold**

None established. High percentage of infested plants is more important than high numbers per plant (3).

**Asparagus beetle** (*Crioceris asparagi*) – The adult asparagus beetle, about ¼ inch long, are readily recognized by the light and dark checkerboard pattern on the back. Beetle eggs are black and adhere to the spears causing contamination problems and makes spears unmarketable unless they are washed. The adults and larvae of the common asparagus beetle feed primarily on the ferns, reducing photosynthetic tissue and reducing the restoration of carbohydrate reserves in the roots.

**Threshold** (3)- Adults: 5 to 10 % of plants infested; eggs: 2% of spears with eggs; larvae: 10% defoliation or 50-75% pf plants with larvae

**Thrips** (various species) – These insects attack the fern growth. Due to the unique mouthparts that thrips have they are able to rasp away the plant cuticle and suck up the plant sap. As a result the effected plants dehydrate rather than become defoliated. Thrips are a major pest of asparagus.

**Threshold-** None established.

**Asparagus fern caterpillar** (*Spodoptera exigua*) – Also known as the beet armyworm, the fern caterpillar is a migratory moth that arrives in southern New Jersey in mid to late summer attacking several vegetable crops. The caterpillar feeding damage is similar to asparagus beetles in that the plant is less able to build nutrient reserves in its roots, hurting the development of next year's crop. This caterpillar is a minor pest.

**Threshold-** None.

**Japanese beetle** (*Popillia japonica*) – These beetles cause minor feeding damage to the ferns by consuming the green tissue. They frequently occur in fern asparagus but are seldom sprayed for.

**Threshold-** None.

**Cutworms** (various species, but primarily black cutworm, *Agrotis ipsilon*) - These insects attack the spears as the spears grow up from the soil. The first spears are the most heavily effected since they tend to grow the slowest. Feeding damage is large chewed areas on the spear near the soil line.

**Threshold-** Either 1 larva per 20 plants, or 1 severely injured spear in 20 (3).

## Chemical Controls

**Insecticides used in 2000** – last year of available data, NJ Pesticide Control Program

### General use insecticides

- **Malathion** –Malathion usage was 9.49 lbs ai or 0.12% of all acreage treated in 2000; it is recommended for use on asparagus aphids and asparagus beetles.
- **Carbaryl** – At least 39% (1,183.73 lbs ai) of the 2000 asparagus acreage was treated with carbaryl. It is recommended for use on asparagus beetles, thrips, and cutworms. Considering that asparagus beetles are, annually, one of the more common asparagus pests it is likely that most of

the carbaryl used was applied to control asparagus beetles. Usually only one application would be needed to control asparagus beetles.

## **Restricted Use Insecticides**

- **Dimethoate** – Dimethoate is a restricted use insecticide in New Jersey. It is recommended for controlling asparagus aphid. The 2000 use of dimethoate was about 1.4% (2 lbs ai) of the asparagus acreage. Usually only one application of dimethoate is needed.
- **Methomyl** – Methomyl is recommended for asparagus beetle, thrips, asparagus fern caterpillar, and cutworms. It was applied to 49.5% (327.42 lbs ai) of the 2000 asparagus, probably mostly for the control of cutworms and thrips. One application per season is probably sufficient for control of asparagus beetle, asparagus fern caterpillar and cutworms. Multiple applications might be needed for thrips.
- **Permethrin** – Permethrin is recommended for use on asparagus beetles, Japanese beetles and cutworms. In 2000, about 0.1% (32.27 lbs ai) of the asparagus acreage was sprayed with permethrin, probably for asparagus beetles. One application per season should be sufficient for asparagus beetles and other pests.

## **Current (2002 Pesticide Recommendations for Insect Pests, Product Rates Per Acre and Use (G=general, R=restricted)(3)**

### **• Cutworms**

- Carbaryl (Sevin Bait) 20 to 40 lb – G
- Methomyl (Lannate LV) 1.5 to 3 pt – R
- Permethrin (Pounce 3.2 EC; Ambush 2EC) 2 to 4 oz; 3.2 to 6.4 oz – R

### **• Asparagus aphid**

- Malathion (Cythion 57EC) 1 qt – G

### **• Asparagus beetles and thrips**

- Carbaryl (Sevin 80S) 1.25 lb – G
- Methomyl (Lannate LV) 1.5 to 3 pt – R
- Malathion (Cythion 57EC) 1 qt – G
- Methoxychlor 50 WP 3 lb – G
- Permethrin (Pounce 3.2 EC; Ambush 2EC) 2 to 4 oz; 3.2 to 6.4 oz – R

### **• Asparagus fern caterpillar**

- Methomyl (Lannate LV) 1.5 to 3 pt – R

- **Japanese beetle**

- Permethrin (Pounce 3.2 EC; Ambush 2EC) 2 to 4 oz; 3.2 to 6.4 oz – R

## **Chemical Use in IPM Programs**

Insecticides are heavily relied upon for asparagus production as there are few naturally occurring biological control agents or cultural methods that are effective for reducing pest insect populations. Selection of an appropriate material is based mostly on its effectiveness. Unfortunately, only 5 insecticides are recommended for use in asparagus.

## **Chemical Use in Resistance Management**

Producers are always encouraged to rotate chemical classes of pesticides.

- **Alternatives-** None
- **Cultural Control Practices-** None
- **Biological Controls-** None
- **Post Harvest Control Practices-** Insecticides are applied when necessary after harvest to prevent loss of fern leaf tissue.

## **Weeds**

All weeds are pests in asparagus, because they will compete with asparagus for nutrients, water and space. Generally, weeds are considered to be at threshold when they are distributed at the rate of .25 weed per square yard (3).

### **Summer Annuals**

**Morningglory** – is a summer annual weed that is particularly troublesome in asparagus. The weed produces long trailing vines that wrap around and smother shorter vegetation. There are few effective herbicides available to asparagus growers that will eliminate morningglory, therefore hand weeding is the best method of control.

### **Perennials**

All perennial weeds should not be allowed to become established in asparagus including common milkweed, Canada thistle, hemp dogbane, horsenettle, johnsongrass, and quackgrass.

**Chemical Controls-** Herbicides used in 2000– last year of available data, NJ Pesticide Control Program

### **General Use Herbicides**

- **Dicamba** – Dicamba currently has a 24(c) exemption for use in asparagus in New Jersey. It is recommended for controlling several species of broadleaved annuals and perennials. In 2000, at 49 acres or about 3% of the asparagus received applications of Dicamba (15.98 lbs ai).
- **Diuron** – Diuron (559.89 lbs ai) was applied to at least 562 acres in 2000, or about 31.4% of the total asparagus acreage. It is used primarily as a pre-emergent herbicide to control broadleaf weeds either before spear emergence or after harvest.
- **Fluazifop-butyl** – This material was applied to at least 3% (11.19 lbs ai) of the total asparagus acreage in 2000. Used under the name of Fusilade, it is an effective grass herbicide that can be used either as post-emergent grass control in seed beds and newly planted fields of crowns, or as a post-emergent material either before spear emergence or after harvest. Usually, only one application per season is needed but sometimes a second application is made.
- **Glyphosate** – Used as Round-up, glyphosate was applied to only 1 acre in 2000. It is a systemic herbicide used prior to planting and also as a spot treatment for problem weeds.
- **Linuron** – Linuron is labeled for use on asparagus only in New Jersey. It is used as a post-emergent and residual herbicide for controlling broadleaf weeds prior to, during, or in post-harvest situations. Sometimes a second application is needed. Linuron (92.5 lbs ai) was applied to at least 115 acres of asparagus in 2000, or about 6% of the asparagus crop.
- **Napropamide** – Used as Devrinol, this material is a grass herbicide applied prior to spear emergence and depending upon overall crop management, either one or two applications would be made in a growing season. In 2000, 126 acres or about 7% of the asparagus crop acreage was treated with napropamide (374.28 lbs ai).
- **Norflurazon** – Norflurazon is a grass herbicide that also suppresses yellow nutsedge. It is used before spears emerge and immediately after harvest. In 2000, 137 acres or about 9% of the asparagus crop was treated. Only one application is used. Norflurazon is a long-lasting material in the soil and sensitive crops should not be planted for 2 years after application.
- **Terbacil** – Sinbar, as a post-emergent herbicide, controls grasses and many broadleaves and is usually applied in combination with other herbicides. It is used prior to harvest or just after

harvest. It shouldn't be used in coarse textured soils or soils with less than 1% organic matter which could limit its use on most southern New Jersey farms. In 2000, it was applied to at least 1 acres.

- **Sethoxydim** – Poast is applied to control certain annual and perennial grasses. In 2000, 4 acres (17.49 lbs ai) or about 0.2% of the asparagus crop was treated with Poast. No more than 5 pints per acre can be applied each year to fields.
- **Simazine** – Princep is applied to control certain grasses and broadleaf weeds. In 2000, 1 acre (0.45 lbs ai) or less than 1% of the asparagus crop was treated with Princep.

### **Restricted Use Herbicides**

- **Metribuzin** – This material primarily controls broadleaved weeds. It is used either prior to spear emergence or just after harvest. It was applied to 493 acres (300.98 lbs ai) in 2000 or 27.5% of the total asparagus acreage. Only one application is made per season.
- **Paraquat** – Paraquat is used as a burn-down material as it is active on succulent plant tissue. It is used prior to asparagus plant emergence in new seedlings, either before or after seeding, and at the end of harvest instead of tillage to control emerged weeds. In 2000 it was used on 210 acres (196.12 lbs ai) or 11.7% of the asparagus.

### **Current (2000) Pesticide Recommendations for Weed Pests, Product Rates Per Acre and Use (G=general, R=restricted) (3)**

Weed control in seedbeds, seeded fields and newly planted crowns

#### **Preplant or Preemergence**

- **Glyphosate** - (Roundup Ultra Max, Glyphosate Plus 4SC, Touchdown) apply according to label annual and perennial weeds
- **Paraquat** - (Gramozone Extra) 1.5 pts per acre - R

#### **Postemergent**

- **Fluazifop** - (Fusilade DX 2E) .5 to .75 pts - for grasses - G
- **Linuron** (Lorox 50 DF) 1 to 2 lbs - Labeled in New Jersey only for postemergent and residual control of broadleaves - G
- **Sethoxydim** (Poast) 1 to 2.5 pts - for annual and perennial grasses - G

## Weed control prior to spear emergence or post-harvest

- **Paraquat** - (Gramoxone Extra) 1.5 – 2.7 pts - R
- **Diuron** - (Karmex 80 DF) 1 to 2.5 lbs - for broadleaves - G
- **Linuron** (Lorox 50DF) 2 to 4 lbs - Labeled in New Jersey only, for postemergent and residual control of broadleaves - G
- **Terbacil** - (Sinbar 80W) 1.5 lbs - for grasses and certain broadleaves - G
- **Metribuzin** - (Sencor 75DF or Lexone 75DF) 1.33 lbs - for broadleaves - G
- **Napropamide** - (Devrinol 50DF) 8 lbs - for annual grasses
- **Norflurazon** - (Solicam 80DF) 2.5 to 5 lbs - for grasses and yellow nutsedge - G
- **Fluazifop** - (Fusilade DX 2E) .5 to .75 pts - for grasses - G
- **Clopyralid** - (Stinger 3A) .5 to .66 pts - annual and perennial broadleaves - G
- **Dicamba** - (Banvel 4SC) .5 to 1 pt - Special 24 C exemption for annual and perennial broadleaves - G
- **Glyphosate** - (Roundup Ultra Max, Gyphosate Plus 4SC, Touchdown) apply according to label annual and perennial weeds
- **2,4 D** - (Formula 40) 1 to 2 qts - for broadleaves - G

## Chemical Use in IPM Programs

Besides using the appropriate materials and timing for controlling weeds in asparagus, there is concern that herbicide residues will affect rotational crops. Since asparagus is a perennial crop that may exist in a field 15 to 20 years this concern doesn't exist until within the last two years of production, before the field is tilled and replanted. **Chemical Use in Resistance Management-** Producers are always encouraged to rotate chemical classes of pesticides.

**Alternatives-** Hand weeding of morningglory can be done.

**Cultural Control Practices-** None

**Biological Controls-** None

**Post Harvest Control Practices-** Chemical weed control is used after harvest, except for morning glory, since weeds are not desired in the fern growth.

## Diseases

**Purple spot** – This fungus attacks both spears and fern growth and is one of the major disease pests. Spear infections come about by the spores entering wounds in the spear from blowing sands and other abrasive damage including insect. The fungus causes small purple lesions that may be quite abundant

making spears unmarketable. Later on the same disease causes elongate tan spots on the fern growth that is surrounded by a darker margin. The fungus over-winters in plant debris and may be a problem in reduced tillage fields. Fungicidal control is not recommended on the spears since the spears continue to grow, exposing new surfaces susceptible to infection, until harvested (3).

**Threshold-** Presence of the disease.

**Rust** – This is a fungal disease that attacks the fern growth. Spores blown in from other areas or from contaminated debris in the field initiate the growth of the fungus. Red pustules develop on the ferns, releasing urediospores, which can quickly infect other plants under optimal conditions. By mid summer these pustules turn black (teliospores) and the subsequently produced spores cannot infect the current season's plants but have to overwinter in plant debris to infect the plants in the next growing season. Washington types of varieties, which were initially resistant, are now susceptible to rust (3).

**Threshold-** Presence of the disease.

**Fusarium root rot** – A soil-borne fungus *Fusarium* occurs in most fields. It has many hosts and will persist in the soil for many years after a host crop has been removed. *Fusarium* infects the roots and crown of the asparagus, but it is a slow acting disease and the wilt is gradual. Infected asparagus roots put out new shoots in response and several New Jersey hybrids may outgrow the disease. Ultimately, probably most asparagus plants succumb to the disease but probably not until the field has passed its peak production and should be replanted anyway. Stress management is the best way to reduce the impact of *Fusarium* by good soil management practices and appropriate use of fertilizer and irrigation.

**Threshold-** No threshold exists.

**Phytophthora crown and spear rot** – Unlike the *Phytophthora* that attacks peppers, the disease attacking asparagus is a minor pest seldom requiring attention.

**Threshold-** Presence of the disease.

**Chemical Controls-** Fungicides used in 2000 – last year of available data, NJ Pesticide Control Program

### General Use Materials

- **Mancozeb** – This material is used for control of rust on the fern growth. Twenty four acres (47.5 lbs ai) were treated in 2000, or about 26% of the asparagus crop acreage.
- **Copper** – Copper is used primarily for plant bacterial infections but might have some activity on rust. Fifteen acres were treated in 2000, or about 2% of the asparagus crop acreage.
- **Azoxystrobin** - Quadris is not labeled for use on asparagus. Two acres (0.24 lbs ai) were treated in 2000.
- **Captan** - This material is is not labeled for use on asparagus. Fifty acres (82.5 lbs ai) were

treated in 2000.

- **Thiophanate Methyl** - This material is not labeled for use on asparagus. Less than 1 acre (3 lbs ai) were treated in 2000, or about 26% of the asparagus crop acreage.

### **Current (2002) Pesticide Recommendations for Disease Pests, Product Rates Per Acre and Use (G=general, R=restricted) (3)**

- **Phytophthora Crown and Spear Rot**
  - Mefenoxam - (Ridomil Gold 4E) 1 pt - G
- **Purple Spot**
  - Chlorothalonil (Bravo, Echo, Equis) 2 – 4 pt 6F - G
- **Rust**
  - Mancozeb - (Dithane Rainsheild NT 80W, or, Penncozeb 80W) 2 lbs. – G
  - Chlorothalonil (Bravo, Echo, Equis) 2 – 4 pt 6F - G
  - Nova 5 oz 40WP - G

**Chemical Use in IPM Programs-** There are relatively few economic diseases, but their management is difficult, because there are few options for disease control, either the use of materials like mancozeb or destroying plant refuse.

**Chemical Use in Resistance Management-** Producers are always encouraged to rotate chemical classes of pesticides.

**Alternatives-** None

**Cultural Control Practices-** Burning the brush of the fern growth is recommended to help reduce overwintering sources of purple spot, especially if purple spot was present in the preceding growing season. If burning is not possible then incorporation of the brush into the soil should be done.

**Biological Controls-** None

**Post Harvest Control Practices-** None

## **Nematodes**

Nematodes, soil-inhabiting plant parasitic worms may cause problems on any crop, but are especially troublesome on perennial crops, because of the difficulty in controlling them once the crop is planted.

Some species of nematodes work synergistically with soil-borne fungi such as Fusarium, reducing plant vigor and production. For this reason a nematicide, Nematicur, is recommended for use prior to planting a field to asparagus. Crop rotation and cover crops are useful alternatives to chemical controls in annual crops but have little value in asparagus production since the crop is perennial and may remain in the field 15 to 20 years.

**Chemical Use- Nematicides used in 2000 – last year of available data, NJ Pesticide Control Program Fenimaphos** – A nematicide, fenimaphos must be used prior to planting seeds or crowns. Nine acres were treated in 2000.

**Current (2002) Pesticide Recommendations for Insect Pests, Product Rates Per Acre and Use (G=general, R=restricted) (3)**

- **Fenimaphos** - (Nematicur) R

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