

## Crop Guide – Blueberries

PLEASE REMEMBER TO ALWAYS READ THE LABEL BEFORE USING ANY CHEMICAL

### Pre-Plant Operations

#### 1. Nematodes and replant disorder

Nematodes are associated with replant disorder in the Southeast; it is unlikely that they are the only pathogen involved in replant disorder, and broader fumigants may be of potential value in replant sites. The main reason for concern is that nematodes can directly destroy roots, resulting in decreased uptake of nutrients and water, as well as increasing root rot diseases. All potential sites should be sampled well ahead of land preparation. Following fumigation, a two-month period is often required before planting. Relatively warm conditions are also required for effective fumigation.

#### 2. Viruses

Blueberry red ringspot virus (BRRV), blueberry necrotic ring blotch virus (BNRBV), Blueberry Mosaic-associated virus (BLMaV), and blueberry latent virus (BILV) have been reported in southeastern blueberry fields. Of these, only BRRV is commercially significant. It is the most common in NC and is most noticeable on Star, but also can be seen on other cultivars. BRRV reduces yield but not enough to warrant pulling out established bushes and is spread is mostly via propagation from infected plants. Blueberry necrotic ring blotch (BNRBV) has disappeared or declined throughout the southeast in recent years and may not be persistent within plants. Since viruses are most commonly introduced through propagation, clean planting stock is essential. Avoid bringing in any plants that have not been inspected for viruses. Tissue-cultured plants are more likely to be free of viruses.

#### 3. Crown gall

All blueberries can be affected by crown gall. Canker-like growths or galls 0.25-2.5 inches in diameter develop on roots and stems; galls are first greenish-white, turning tan to brown, and then black. Use of tissue-cultured plants will also help to prevent introduction of crown-gall infected plants, but crown gall is rare in propagated blueberries. Inspect new shipments for galls, and do not plant if galls are observed.

#### 4. Phytophthora root rot

Root rot is generally a problem of low, poorly drained sites. Provisions for adequate drainage must be made prior to planting! Site selection and/or proper bedding operations are essential cultural practices for control of this disease. Treatment with fungicides is not effective for reversing root rot damage on plants with severe symptoms

PEST/PROBLEM	OPTION	AMOUNT/HA	COMMENTS
NEMATODES	ETHYLENE DIBROMIDE	24LTS/HA	Wait a minimum of 3 weeks from application to planting
NEMATODES	TELONE	100LTS/HA	Wait a minimum of 4 weeks from application to planting
NEMATODES	METHAM SODIUM	120LTS/HA	Wait a minimum of 4 weeks from application to planting
NEMATODES	VELUM 400SC	2.5LTS/HA	Apply with plenty of planting water to incorporate chemical deep into root zone

## Establishment

### 1. Variety selection & Plant source

It is important to purchase disease-free plants. Plants propagated using tissue culture (rather than cuttings from field-grown plants) are preferred, and are far less likely to harbour disease. Growers propagating their own plants from cuttings should be aware that viral diseases (red ring spot), bacterial diseases (bacterial scorch), fungal pathogens, and insects (blueberry bud mite) are moved through propagation of infected or infested plants. Always use plants of known status. Disease susceptibility can also vary by variety.

### 2. Plant beds *Phytophthora* root rot

Root rot is generally a problem of low, poorly drained sites. Provisions for adequate drainage must be made prior to planting! Treatment with fungicides is not effective for reversing root rot damage on plants with severe symptoms. Preventative treatments in pine bark beds may be warranted, since the beds are often saturated with water through either irrigation or rainfall.

### 3. Root rots in bark beds

Root rots of blueberry can be particularly problematic immediately following transplanting and until plants are well established. Even in well-drained soils, root rots have been observed in bark-amended beds, and root rots are particularly damaging in high-density bark beds. Though cost is an issue, replanting into old bark where root rot has been a problem is not a good practice; disease-causing organisms build up in the bark, making reestablishment more difficult. It is recommended that phosphite-containing materials (Aliette etc.) be utilized in non-bearing plants after establishment for bedded and high-density bark plantings. Fully-expanded leaf tissue is required for plant uptake of these materials, as they are foliar-applied. In the initial year of planting, a minimum of four applications (spaced approximately one month apart) would be advisable. In general, phosphite materials are acidic, and they should not be applied with acidifiers or acidic water (pH < 6). Excessive application or application intervals which are less than those dictated by label will result in plant injury. These phosphite materials also suppress *Septoria* leaf spot and anthracnose, major foliar diseases of young plants. Some of the phosphite materials are labeled for use as drenches or chemigation, but there is currently limited information as to the success of these methods in southern blueberry production. There are residue concerns for phosphites for export to the European Union. Consult with your purchaser before using these materials.

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In high-density bark beds, use of Ridomil Gold SL will also provide good control of Pythium and Phytophthora root rots; use of Ridomil Gold SL in field plantings is very expensive and difficult, since the product has to be taken up by the roots for activity. Where possible, rotation of Ridomil Gold SL and phosphites is a good resistance-management practice. Do not exceed label recommendations. Fungicides will not correct problems caused by poor drainage. Rhizoctonia root rot is also an occasional issue in bark beds and in newly planted fields. Abound is registered for use in blueberry field plantings; when utilized for other diseases of blueberry and applied in sufficient total volume to allow crown/root contact, suppression of Rhizoctonia has also been achieved.

PEST/PROBLEM	OPTION	AMOUNT/HA	COMMENTS
PHYTOPHTHORA ROOT ROT	RIDOMIL GOLD	2.5KGS/HA	Apply in 500-1500lts water per hectare. Can be used twice per season
PHYTOPHTHORA ROOT ROT	ALLETTE WDG	4.6KGS/HA	Do not tank mix aliette with any copper compound or apply to foliage with copper residue
FUSICOCCOM CANKER, PHOMOPSIS TWIG BLIGHT	CUPERDEM	3LTS/HA	Apply in 500-1000lts water per hectare. Repeat at 14 day intervals up to a maximum of 6 sprays per season
GALL MIDGE	MOVENTO	20MLS MOVENTO + 300MLS MINERAL OIL PER 100LTS WATER	Apply as full cover spray (500-1000lts mixture/ha). Blueberry gall midge adults are tiny flies, and larvae are tiny white, carrot shaped maggots which feeds inside flower buds

PEST/PROBLEM	OPTION	AMOUNT/HA	COMMENTS
GYPSY MOTH	BELT	50MLS/HA	Apply as full cover spray. Apply with aquaright 5
GYPSY MOTH	MAGMECTIN DUO	250MLS/HA	Apply as full cover spray
EXOBASIDIUM LEAF AND FRUIT SPOT	CAPTAN 50WP	5.6KGS/KA	Do Not Apply More Than 70kgs/Ha Per Season.
THRIPS	MOVENTO	20MLS MOVENTO + 300MLS MINERAL OIL PER 100LTS WATER	Apply As Full Cover Spray (500 -1000lts Mixture/Ha)
THRIPS	PLESIVA STAR	270G/HA	
THRIPS	ACETAMIPRID	350G/HA	Apply as full cover spray
THRIPS	ACTARA	200G/HA	Apply as full cover spray
THRIPS	SIVANTO PRIME	1LT/HA	Apply as full cover spray
MUMMY BERRY	CAPTAN 50WP	1.5 – 3KGS/HA	Apply as full cover spray
MUMMY BERRY	ORTIVA	1LT/HA	Apply as full cover spray
MUMMY BERRY	AZOXY DUO	500MLS/HA	Apply as full cover spray
MUMMY BERRY	CABRIO DUO	2.5LTS/HA	Apply as full cover spray
BOTRYTIS BLOSSOM AND TWIG BLIGHT	CAPTAN 50WP	1.5 – 3KGS/HA	Apply as full cover spray
BOTRYTIS BLOSSOM AND TWIG BLIGHT	CABRIO DUO	2.5LTS/HA	Apply as full cover spray

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GYPSY MOTH			See above
MUMMY BERRY			See above
ANTHRACNOSE OR ALTERNARIA ROT	CAPTAN 50WP	1.5 – 3KGS/HA	Apply as full cover spray
ANTHRACNOSE OR ALTERNARIA ROT	ORTIVA	1LT/HA	Apply as full cover spray
ANTHRACNOSE OR ALTERNARIA ROT	AZOXY DUO	500MLS/HA	Apply as full cover spray
ANTHRACNOSE OR ALTERNARIA ROT	CABRIO DUO	2.5LTS/HA	Apply as full cover spray
BLUEBERRY LEAF RUST	CABRIO DUO	2.5LTS/HA	Apply as full cover spray
BLUEBERRY LEAF RUST	BENOMYL	200G/HA	Apply As Full Cover Spray. Apply With 20mls Wetting Agent
POWDERY MILDEW	TEBUCONAZOLE	750MLS/HA	Apply as full cover spray
POWDERY MILDEW	AZOXY DUO	500MLS/HA	Apply as full cover spray
POWDERY MILDEW	CUPERDEM	3LTS/HA	Apply With 1000lts Water
POWDERY MILDEW	FOLICUR	750MLS/HA	Apply as full cover spray
WHITEFLY	CALYPSO	100MLS/HA	Apply as full cover spray
WHITEFLY	OBERON	600LT/HA	Apply as full cover spray
WHITEFLY	THUNDER	330MLS/HA	Apply as full cover spray
WHITEFLY	BELT EXPERT	120MLS/HA	Apply as full cover spray
WHITEFLY	ACETAMIPRID	350G/HA	Apply as full cover spray
WHITEFLY	AMPLIGO	300MLS/HA	Apply as full cover spray
WHITEFLY	DYNAMEC	560MLS/HA	Apply as full cover spray
WHITEFLY	PLESIVA STAR	270G/HA	Apply as soil application
WHITEFLY	MOVENTO	20MLS MOVENTO + 300MLS MINERAL OIL PER 100LTS WATER	Apply As Full Cover Spray (500 -1000lts Mixture/Ha)
CAPSID	ACETAMIPRID	350G/HA	Apply as full cover spray
CAPSID	KARATE ZEON	250MLS/HA	Apply as full cover spray
CAPSID	DECIS FORTE	50MLS/HA	Apply as full cover spray
CAPSID	THUNDER	330MLS/HA	Apply as full cover spray
FRUITWORM	BELT	50MLS/HA	Apply as full cover spray
FRUITWORM	THUNDER	330MLS/HA	Apply as full cover spray
FRUITWORM	MAGMECTIN	500MLS/HA	Apply as full cover spray
FRUITWORM	LANATE	1KG/HA	Apply as full cover spray
FRUITWORM	PLESIVA STAR	270G/HA	Apply as soil application
FRUITWORM	LARVIN	660MLS/HA	Apply as full cover spray
FRUITWORM	BLANKET	250MLS/HA	Apply as full cover spray
WHITEGRUB	PLESIVA STAR	270G/HA	Apply as soil application
WHITEGRUB	CHLORPYRIPHOS	2LTS/HA	Apply as full cover spray
APHID	PLESIVA STAR	270G/HA	Apply as soil application
APHID	ACETAMIPRID	350G/HA	Apply as full cover spray
APHID	ACTARA	200G/HA	Apply as full cover spray
APHID	SIVANTO PRIME	1LT/HA	Apply as full cover spray
APHID	AMPLIGO	300MLS/HA	Apply as full cover spray
APHID	BELT EXPERT	120MLS/HA	Apply as full cover spray
BLUEBERRY MAGGOT	MOVENTO	20MLS MOVENTO + 300MLS	Apply As Full Cover Spray (500 -1000lts Mixture/Ha)

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		MINERAL OIL PER 100LTS WATER	
BLUEBERRY MAGGOT	SIVANTO PRIME	1LT/HA	Apply as full cover spray
BLUEBERRY MAGGOT	LANATE	1KG/HA	Apply as full cover spray
BLUEBERRY MAGGOT	PLESIVA STAR	270G/HA	Apply as soil application
BLUEBERRY MAGGOT	LARVIN	660MLS/HA	Apply as full cover spray
BLUEBERRY MAGGOT	KARATE ZEON	250MLS/HA	Apply as full cover spray
STINKBUG	KARATE ZEON	250MLS/HA	Apply as full cover spray
STINKBUG	DECIS FORTE	50MLS/HA	Apply as full cover spray
STINKBUG	THUNDER	330MLS/HA	Apply as full cover spray
STINKBUG	LANATE	1KG/HA	Apply as full cover spray
STINKBUG	LARVIN	660MLS/HA	Apply as full cover spray
SCARAB BEETLE	ACTARA	200G/HA	Apply as full cover spray
SCARAB BEETLE	CONFIDOR	280G/HA	Apply as soil application
SCARAB BEETLE	PLESIVA STAR	270G/HA	Apply as soil application

## Fertilization Of Blueberries

### 1. Applying Dry Fertilizer to Blueberries

Fertilizer is usually applied to blueberries in the spring when growth begins and immediately after harvest. The exception to this is when the fertilizer is injected into the irrigation system, in which case, it is done on a weekly basis during the growing season (except during harvest).

Blueberry plants are very sensitive to readily soluble fertilizers and excessive amounts can cause plant injury or death. Higher than recommended rates can be damaging causing brown necrotic leaf margins or pale-yellow chlorosis of leaves and low vigor, particularly where too little water is applied. Do not concentrate fertilizer in a small area around plants. Do not use nitrate forms of fertilizer. Ammonium sulfate is the most often used nitrogen source. Ammonium nitrate and other nitrate containing fertilizers should be avoided because nitrate ions are very damaging to blueberries. Blueberries also respond well to fertilizers containing urea, diammonium phosphate and slow-release type nitrogen fertilizers. Ammonium sulfate has an acidic reaction with the soil. Continual use of ammonium sulfate may reduce the soil pH below the desired range of 4.0 to 5.0. (Zim Testing). Urea nitrogen is less acid forming than ammonium sulfate. If the soil pH is below 5, the urea form of nitrogen is preferred. If the pH is above 5, ammonium sulfate can be used. To reduce the pH considerable, you can use Tiger 90.

**First Year** — Uniformly distribute 18 kgs of nitrogen per ha after the first flush of growth is complete (6 to 8 weeks after planting) within a band 1 ft on each side of the plant.

Fertilizer can also be applied by hand around individual bushes. Uniformly distribute 12-12-12 within a circle 30cms from the plant. Use proportionately more 10-10-10 or 8-8-8. Repeat applications using ammonium nitrate or ammonium sulfate every 4 to 6 weeks. Use 56 kgs/ha of ammonium nitrate or 90kgs/ha of ammonium sulfate in a 60cm band (30cm on each side of the bush).

**Second Year** — Double the first year rates, but increase the band width to 90cms or the circle around individual plants to 45cms.

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**Bearing Plants** — Apply 340-560 kgs/ha of 12-12-12 or an equivalent amount of 10-10-10 or 8-8-8 in a 1 to 1,2m band. Side dress with 34kgs/ha of N (about 115 kgs of ammonium nitrate or 170 kgs of ammonium sulfate) per ha 4-6 weeks later.

## **Liquid Fertilization**

Fertilizer may be applied in liquid form through the irrigation system rather than surface applying dry granular material.

There are some advantages to fertigation. Fertilizer is more efficiently used, it may be applied weekly in small amounts so that it is more available when the plant needs it, application cost is considerably less and nutrients more quickly reach the root zone in a soluble form.

There are also some disadvantages, including:

- Irregular growth and possible damage to plants if the irrigation system is not working properly.
- Specialized equipment must be added to the irrigation system.
- Soluble fertilizer is relatively more expensive than granular fertilizer.

It is important that the irrigation system functions properly and all plants are receiving the same amount of water. If water distribution is erratic, some plants may be under fertilized while other plants may receive more than is needed. On sloping ground the use of pressure compensating emitters is necessary to insure that plants in the low areas do not receive more water than those on the higher ground.

Follow up with a proper and regular watering program after liquid fertilizer is applied. Proper irrigation will allow the fertilizer to stay in solution until the plant has taken it up. If the fertilizer solution dries in the soil, the fertilizer within the solution becomes more concentrated and can become toxic if additional water is not applied. Regular watering between fertilizer applications help to wash the solution deeper into the root zone and encourages a larger, deeper and healthier root system.

Because liquid fertilizer is more efficiently placed and is more readily available throughout the growing season, it is easy to force more growth than is needed. Most fruit is born on the last eight to 10 inches of the previous year's growth. If more than 12 inches to 14 inches of growth is generated, the extra growth should be considered excessive.

During the first four or five years, rapid growth is desired. However, if the plant grows too rapidly during the early years, it may become tall and leggy with only a small amount of fruiting wood. Some tipping of the upright branches may be necessary to produce the branching needed for maximum fruit production.

Liquid fertilizer should be applied to blueberries by incorporating it into the watering program once per week. Irrigation water should be allowed to run for one hour to fill the irrigation system and moisten the soil at the root zone. The recommended amount of fertilizer solution should then be introduced into the irrigation water for one or two hours, and then fresh water applied for one hour. This method will allow the system to fill with water and moisten the ground, allow the fertilizer to be applied, flush the system of salts and wash the nutrients into the root zone.

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AGE OF PLANT	KGS OF ACTUAL N/HA ANNUALLY	KGS OF ACTUAL N/HA/WEEK (25 WEEKS)
<b>1 year</b>	11.2	0.45
<b>2 years</b>	22.4	0.90
<b>3 years</b>	33.6	1.35
<b>4 years</b>	44.8	1.80
<b>5 years</b>	56.0	2.25

**A general guideline for splitting K application in fertigation programs for blueberries:**

GROWTH STAGE	SHARE OF K <sub>2</sub> O AT STAGE (%)	RECOMMENDED RATE (KG/HA OF K <sub>2</sub> O)
Leaf emergence	15	30
Flowering	20	40
Fruit-set	25	50
Fruit growth	25	50
Fruit maturation	15	30
<b>Total</b>	<b>100</b>	<b>200</b>

### Leaf and Soil Sampling

Leaf and soil samples are very useful tools in blueberry fertilization. Leaf samples should be collected from mature leaves in the mid-portion of current season's growth the first two weeks after harvest. A double fist full of leaves should be harvested from across the field, washed in tap water, dried and taken to your testing station. Soil and leaf samples will not always have perfectly matching results. An element maybe medium in the soil and low in the leaves, etc. Nevertheless they are useful in gaining a picture of what is happening in your fields and where the fertility program may need to be changed. One element that produces unreliable leaf results is iron. Plants growing at a pH above 5.3 will show iron deficiency but still have normal iron levels in the leaves. The iron is in an unavailable form in the leaf.

### Standard Range for Element Deficiency

	BELOW MINIMUM	EXCESS
Nitrogen (N)	1.70	2.50
Phosphorus (P)	0.10	0.80
Potassium (K)	0.30	0.95
Calcium (Ca)	0.13	1.00
Magnesium (Mg)	0.08	0.45
Sulphur (S)	0.10	N/A
Manganese (Mn)	23	450
Iron (Fe)	60	400
Zinc (Zn)	8	80
Copper (Cu)	5	100

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Boron (B)	20	200
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### **Maguires Fertilizers for Blueberries**

1. Kynopop
2. Veggie Oemff – Start, Grow & Fruit
3. Suggested Blend – Mix 50kgs 6.23.23 with 25kgs Ammonium Sulphate (16.15.15)
4. Ammonium Sulphate
5. Sulphate of Potash
6. Mono Ammonium Phosphate (Tech)
7. Magnesium Sulphate
8. K-Leaf
9. Zinc Sulphate
10. Green Gold (Calcium, urea & boron)
11. Urea
12. Full Chelated trace range

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