Crop Production Guide

Dry Bulb Onion

Introduction

Bulb onions are derived from the species Allium cepa. Onion is closely related to other crop species in Allium genus such as leek, garlic and chive. Onions are a versatile crop in that plants can be started from seed, planted as a transplant, or planted as onion sets. All three methods have their own benefits and draw backs. Green onions and shallots are essentially the same as bulb onions; however, they are harvested early before the iconic bulb of a dry onion has formed.

Growth Requirements

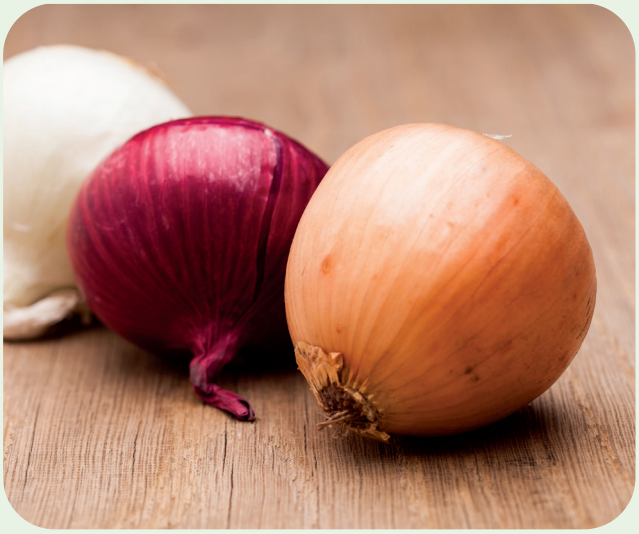
Onion plants develop a relatively short, stocky root system, which typically does not grow deeper than 45 cm. As such, onions respond well when grown in soils with good water-holding capacity. A consistent supply of water early in the season is crucial for plant establishment. In addition, early season drought stress can cause young plants to start developing the bulb prematurely, which can cause serious reduction in yield at the end of the season. This can be especially detrimental to marketable yields in green onions. Onions planted from sets can be stressed by cold temperatures early in the season, which may cause them to prematurely bolt (flower), and have major repercussions on marketable yields.

Vegetable cultivars suggested in this production guide are based on available season length, tolerance to disease, and suitability for current production practices prevalent in the Province of Newfoundland and Labrador.

Norstar, Highlander, Prince, Candy (Spanish), Red Wing (Red)

Onion

Onion



Nutritional Value

One medium onion contains 40 kcal, as well as Vitamin C, calcium and potassium.

Crop Establishment

Seed Germination

Onion seed will germinate anywhere between 6 and 40˚C however, temperatures at the extremes will cause slow and uneven germination. Optimal germination for onions occurs between 10 and 35˚C. While established onion plants are frost tolerant, onion seedlings can become damaged when temperatures drop below 0˚C.

Seeding/Planting

Spacing for onions varies depending upon whether seed, transplant or sets are to be planted in the field. For direct seeded bunching onions, rows are spaced at 30-40 cm, with seeds placed one to four cm apart in the row. Do not place onion seed deeper than 1.5 cm during seeding, as seeds placed deeper may show low germination rates. Onion sets are planted in rows 60 cm apart with approximately four cm between sets. For large Spanish onions, place sets seven to eight cm apart within the row. To produce onions from transplants, rows should be spaced at 30-40 cm with plants spaced approximately 12 cm apart.

Crop Management

Onions are adapted to cool growing season conditions and show maximal growth rates during temperatures of 13 to 24˚C. Established onion plants are fairly frost-resistant and most cultivars can handle temperatures as low as -4˚C. Onions are a shallow rooted crop and as such require frequent but light irrigation. Onion seedlings are sensitive to drought, and water-stressed onion seedlings can develop bulbs prematurely, which causes drastic reductions in yield. Natural bulb formation initiates in onion when daylights are between 13-16 hours long (depending on cultivar).

Nutrition

All soil fertility and limestone applications require soil analysis at the provincial Soil, Plant and Feed Laboratory. Test soil before undertaking any agricultural activities. Consult your crop or soil fertility specialist for production recommendations.

Nitrogen: Onions are modest nitrogen users, and have a total nitrogen requirement of 120 kg/ha for mineral soil and 180 kg/ha for organic soil. Nitrogen is usually supplied at two intervals with two-thirds of the total nitrogen by broadcasting and disking prior to planting. The remaining one-third is applied four to six weeks after transplanting.

Phosphorus: Onion crops are unlikely to respond to additional phosphorus application if soil test values are above 375 mg/L. For organic soil, please consult your crop or soil fertility specialist.

Potassium: Onion crops are unlikely to respond to additional potassium applications if soil test values are above 300 mg/L for mineral soil and 600 mg/L for organic soil.

Micronutrients:

Copper: Symptoms of copper deficiency in onions include tipburn and twisting of the leaves. Deficiencies usually occur in acidic soils with sandy texture or in peat soils. Copper can be applied during broadcast at approximately 11-13 kg/ha.

Molybdenum: Deficiency symptoms manifest as wilting and tip die back. Deficiency usually occurs in acidic soils. Foliar application is recommended if deficiency symptoms present themselves in season.

Boron: Boron deficiency manifests as stunted or distorted growth in onion. Young foliage can take on a mottled yellow appearance. Plants may also exhibit tip dieback. Boron can be applied by broadcast prior to planting at rates of 1 kg/ha if soil test reports show low levels or previous crop exhibited symptoms of boron deficiency.

Foliar application is recommended if deficiency symptoms present themselves in season.

If deficiency symptoms are suspected, contact your crop or soil fertility specialist for diagnostic services (soil or plant tissue analysis may be needed).

Application

Typically all prescribed phosphorous, potassium, micronutrients and two-thirds of the prescribed nitrogen are broadcast applied and disked in prior to planting. For onions, the remaining one-third of the prescribed nitrogen should be side dressed four to six weeks after planting. If plastic mulch is utilized, the remaining nitrogen can be applied as fertigation.

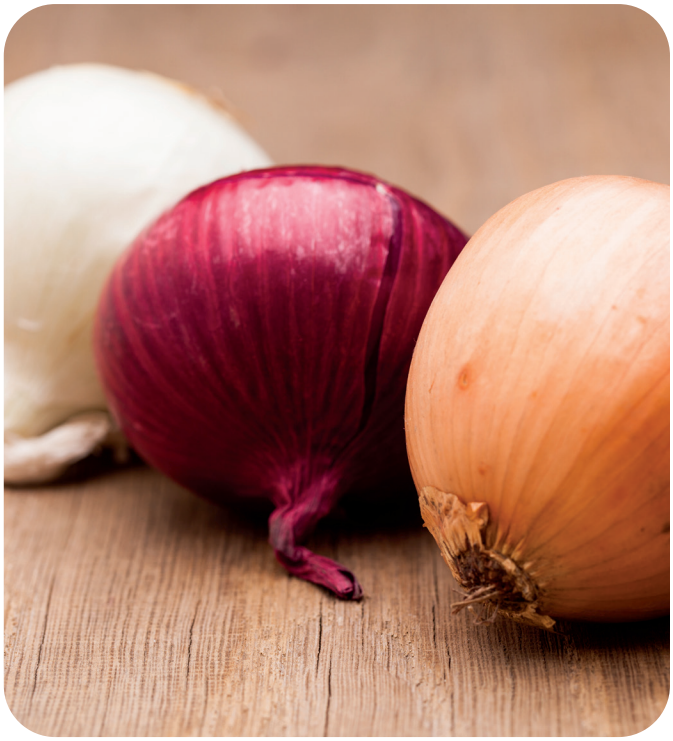
If applying raw manure, it must be applied at least 120 days before harvest.

Growers should either:

- Use properly composted or otherwise sterilized manure for application during the current growing season, or
- Apply raw manure in the fall before crops are planted the next spring.

Climatic Limitations

Cool temperatures early in the growing season can contribute to premature flowering (bolting) in onions, which greatly reduces bulb size and affects flavor. Onions are photoperiodic and initial bulb formation is based upon day lengths. Photoperiods greater than 13 hours are conducive to bulb formation. In the Newfoundland and Labrador environment, direct seeding of onion will need to commence as soon as soil temperatures are adequate for germination to acquire maximal yield. As such, transplanting of bulb onions is recommended in the province of Newfoundland and Labrador.



Pests and Diseases

Disease: Root Rot (Rhizoctonia, Fusarium and Pythium)

Characteristics: "Damping off" is a common name given to the symptoms of infection of seedlings by root rot fungus from the genuses Rhizoctonia, Fusarium and Pythium. While the organisms that can cause this disease are not closely related, they share the same set of symptoms and controls. These diseases affect seedlings and young plants by rotting the root system, which manifests as weak, stunted seedlings that eventually wilt and topple. These diseases can be present in both direct seeded crops and in transplants.



Control: For onion transplants, the disease can be removed by sterilizing the trays and growth media the transplants are grown in. Adequate air flow is essential. Filling trays so that the media is flush with the top of the tray, and periodically lifting any covering so that moisture can escape, are necessary to ensure seedlings are not affected by the root rot fungi associated with damping off.

In the field, adequate drainage and proper seed or transplant spacing are necessary to release excess moisture from the soil. Excess moisture and wet conditions are favorable to the development of root rot diseases associated with damping off.

Disease: Bacterial Soft Rot/Neck Rot

Characteristics: These diseases usually occur in storage after harvest and tend to enter through tissues near the neck of the onion. As such, onions that have thick necks, or onions that were not completely dried and cured, are susceptible to losses from this disease.

Control: Proper harvest timing, drying and curing are essential to make sure that these diseases do not cause losses in storage.

Insects: Onion Root Maggot

Characteristics: Onion maggots over-winter in the soil in the form of a pupa. In spring, from early May to late June, adult flies emerge from the pupa, mate, and look for a suitable onion crop to lay eggs. Eggs are laid on the soil at the base of the onion. Within a week of laying, white-colored larvae (maggot) will emerge, burrow into the ground and begin to consume the root system of the onion. When larvae have finished feeding, they form a pupa to over-winter. In most regions of Canada, at least two generations of adult flies are produced per season.

Control: Similar to cabbage root maggot, there have been models created to accurately predict the emergence of adult flies based on heat accumulation. This type of modeling helps to focus efforts to prevent damage based upon predicted emergence time period. Sticky tape and other types of traps can be effective if utilized at the right time. For heavy infestations or for more complete control a soil drench may be advisable.



Harvest and Handling

Onions should be harvested when the neck tissues start to soften and fall over in the field. If the neck is soft and malleable, the onion is mature and harvestable. Conversely, if the neck is stiff, the onion is immature. The general rule of thumb is to harvest when between 25-50 per cent of the onion crop have had their “tops” or leaves knocked over in the field.

Onions should be thoroughly dry before lifting. Use a potato lifter to undercut the onion row. If weather conditions are warm and dry, onions can be partially dried/cured in the field; however, under regular fall weather conditions in Newfoundland and Labrador, drying or curing in the field is not possible. After lifting, store onions in burlap bags or storage bins. The bins must have at least six per cent vent (open) space to allow for air flow. Bring bins into a storage area where air movement will not be restricted.

Drying/Curing

Onions in bag or bins can be placed in an open area and air can be moved through the onions to dry them. To rapidly dry onions, pass two cubic feet of air per cubic foot of onion in the bin. Onion bins should be no deeper than eight feet. For the most rapid and efficient drying, air should be kept at approximately 75 per cent relative humidity (RH). Heated air can also be used to decrease drying times; however, the air temperature must be kept below 35˚C to prevent excess weight loss and/or damage to the onion. Monitor RH and temperature.

Curing the onions is very similar to drying; warm air is still forced through the onions to remove moisture from the leaves, roots and outer scale. For curing, air movement can be reduced to around one cubic foot of air per cubic foot of onion, and the RH of the air can be reduced to around 50 per cent. Curing of onions is complete when the neck is fully dry (you can press the neck between your index finger and thumb and rub and the neck should not sluff), and the roots leaves and outer scales have fully dried. At this point, tops and roots can be removed and the onions can be placed in storage.

Storage Conditions

Onions can be stored at around 0˚C with a RH of 65-75 per cent. Note that the RH for onion storage is substantially lower than the RH suggested for most other crops. It is suggested that onions be stored is a separate compartment of the storage when RH can be controlled separately from other crops.

For more information about crop production and soil fertility services contact: 709.637.2046