



AGRONOMIC SPOTLIGHT

Selecting Onion Varieties

- » Varietal day length requirements should fit with the growing region and planting season.
- » Onion varieties vary in bulb size, shape, flavor, and storability.
- » Resistance is available to some important diseases.

Day length and relative maturity

The physiological trigger for bulbing in onions is controlled by day length and temperature. Short-day varieties require day lengths of 12-13 hours; medium-day length varieties require 13-14 hours; and long-day varieties require 15 hours or more.¹ The type of onion grown will depend on the latitude of the growing region. The onion production areas in the Northeast and Pacific Northwest regions of the U.S. and Canada require long-day varieties, although some medium-day types are grown. Short-day varieties are grown in the southern regions of the U. S. The day length requirements of the variety will also determine the proper time of planting, with short day types commonly planted in the fall, medium day types in the winter, and long day types generally planted in the spring.²

In addition to day length adaptations, onion varieties also vary in relative maturity within a day length group. Within the long-day types, shorter maturity varieties, ready to harvest in 90 to 115 days, are generally preferred in the Northeast growing regions of the U. S. and Canada, as humid conditions in the fall promote disease development, and a shorter time to maturity allows for adequate dry down prior to harvest. In the Pacific Northwest, it is more common to grow longer maturing varieties that require 112 to 135 days. The warm, arid conditions in this region in the fall are less favorable for rotting diseases and allow for a longer harvest window. Early maturing varieties may be grown in this region to produce onions for the late summer/early fall market.

Bulb type: Size, shape, skin

The various onion producing regions also differ in the types of onions that are grown. In the Northeastern U. S. and Canada, production is focused primarily on storage types of onions. These onions produce medium (2 ¼" to 3" diameter) sized, "harder" bulbs that contain high levels of soluble solids and have a pungent flavor. They have thick, multi-layered, dark colored skin with good retention. They also have leaves ("tops") that grow in an erect fashion and have a thick waxy layer, characteristics that make these plants less susceptible to foliar diseases that are more common in this region. They also have small necks (where the leaves emerge from the bulb), allowing them to dry down quickly and reduce the incidence of disease development by bulb rot organisms.



Figure 1. Varieties produce bulbs of different sizes and shapes.

In the U. S. Pacific Northwest, Spanish onion types are more commonly grown. Spanish onions are somewhat larger (3" and larger diameter), globe shaped, have a less pungent flavor, and are better adapted for warmer temperatures. These types have tops that are less erect than the storage types and more heat tolerant, protecting the bulbs during the hot summer months. These varieties are used for fresh market sales and for processing (chopped onions or for onion rings). Onions with a variety of skin colors are also grown in this region. Onions can have skin colors that vary from white to yellow to dark yellow/brown, to red.³

The desired type of skin covering varies with the intended market. For storage types of onions, the market prefers multi-layered coverage, and grade reductions can be assessed for bulbs with splits or poor coverage. Processors, however, have to remove the skin prior to processing. So they generally prefer bulbs with less thick and fewer skin layers.

TABLE 1. BULB SIZE CLASSIFICATIONS⁴

Size Classification	Bulb Diameter (inches)
Super Colossal	4 to 4½ and up
Colossal	3¾ and up
Jumbo	3 to 3¾
Medium	2 to 3¾

Bulbs are grouped into size classes, based on bulb diameter (Table 1).⁴ Processors generally want large bulbs, as these provide better efficiencies in processing. The outer bulb layers are removed before processing, so starting with a

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large bulb can ensure adequate ring sizes and better recovery of product.

Medium to jumbo sized bulbs are generally grown for fresh market retail, while the large jumbo to super colossal bulbs are preferred for processing. Bulb size does vary among varieties, but size can also be adjusted by changing planting densities. Onions are planted at densities from 125,000 to 300,000 plants per acre, depending on desired size profile. The size profile of the bulbs will be larger at lower plant densities and smaller at higher plant densities.

Bulbs vary in shape from flat to tall globe shaped (Figure 1).³ In general, the globe shaped bulbs are preferred for both fresh market and processing. However, due to marketing efforts to differentiate “sweet onions” in the market, there has been effort to associate a flatter bulb shape with low pungency, and this has resulted in consumer preference for flatter shapes of premium low pungency varieties. In post harvest sorting, bulb size is commonly estimated by bulb weight, and these estimates are more precise with globe shaped bulbs. Some varieties tend to produce “tall” bulbs that are longer than they are wide, a shape that is less desirable.

Disease resistance

The two most wide-spread root disease problems on onions are Fusarium basal rot and pink root, both caused by fungi that live in the soil, and both pathogens are more active at higher soil temperatures. Commercial varieties and hybrids are commonly screened for resistance to these two diseases.^{5,6} In very warm growing areas, such as South Texas, where short day onions are grown, pink root rot resistance is a necessity in all varieties for commercial production because of the prevalence of the pathogen in almost all soils. Pink root rot susceptible varieties simply cannot produce commercially economic yields under these conditions.

Foliar diseases, such as Botrytis leaf blight, Stemphylium leaf blight, purple blotch, downy mildew, and several bacterial diseases are more prevalent in areas with rainy/humid conditions during the growing season, such as the northeastern and southeastern states and Ontario. There are varying levels of resistance to these diseases in commercial varieties, but no reliable screening method has been developed to routinely screen and rate this resistance, so no resistance claims can be made. The sweet Spanish types tend to be more susceptible to Botrytis leaf blight,⁷ and the waxy, upright tops of varieties favored in the eastern regions tend to be less susceptible to these foliar diseases.

Iris yellow spot virus (IYSV) is becoming more prevalent and more of a problem in the western growing regions of the U. S. Resistance to IYSV has not been demonstrated in

commercial onion varieties, although preference for certain varieties by the onion thrips vector may influence the amount of disease in the crop. Some varieties may be more tolerant of the virus and express the symptoms less readily (Figure 2). However, the only known method of controlling IYSV is to control onion thrips, the vector of the disease.

Genetic adaptation and tolerance of abiotic disorders is an important factor as well. In eastern regions of the U. S. and Canada, the development of physiological tip burn, while bulbs are sizing, can result in increased levels of bulb rot as pathogens colonize dying leaf tissues. Therefore, selecting varieties less likely to develop tip burn can be important. In western growing regions of the U. S., it is important to select varieties with good heat tolerance and tops that hold up during periods of warm weather. Similarly, varieties selected for the early part of the growing season should have a good level of cold tolerance and not be prone to early bolting, as this condition is triggered by cool temperatures.



Figure 2. Severe (background) and milder (foreground) symptoms of Iris yellow spot virus infection of onion.

Sources:

- ¹ University of Georgia, Cooperative Extension. 2014. Onion production guide, Bulletin 1198-2.
- ² Rutgers NJAES. 2015. Commercial vegetable production recommendations for New Jersey. Publication E001.
- ³ Penn State Cooperative Extension. 2000. Agricultural alternatives: Onion production.
- ⁴ National Onion Association. <https://www.onions-usa.org/retail/sizes-and-packaging-options>.
- ⁵ Ganeshan, G., Pathak, C. S., and Gowda, R. V. 1998. Reaction of onion lines to basal rot disease caused by Fusarium oxysporum f.sp. cepae. PKV Research Journal 22:53-54.
- ⁶ Nico, A. I. and Sanchez, M. G. 2012. Response of different intermediate-day onion hybrids to natural infestation by Phoma terrestris and Fusarium oxysporum f. sp cepae in Ciudad Real, Spain with assessment of different soil disinfection methods. European Journal Of Plant Pathology 134:783-793.
- ⁷ Reiners, S. et al. 2016. Cornell integrated crop and pest management guidelines for commercial vegetable production.
- ⁸ Goldberg, N. 2010. Iris Yellow Spot Virus. New Mexico State University Cooperative Extension Service, Guide H-255. Websites verified 2/11/16.

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