

**Commercial vegetable  
production:  
bulb onions**J.E. Ells, H.F. Schwartz, W.S. Cranshaw<sup>1</sup>

no. 7.619

**Quick Facts**

Onions are grown in three principal areas in Colorado: Arkansas Valley, Northern Colorado and the Western Slope.

The principal sweet Spanish type onion is Colorado #6 while the principal yellow storage onion is Brown Beauty.

Thrips are the most persistent insect.

Storage loss due to *Botrytis* can be reduced by properly curing onions.

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Colorado produces 12,000 acres of dry bulb onions in three principal growing areas. The Northern Colorado area consists primarily of Adams and Weld counties where 5,000 A are field seeded for storage and another 2,000 A are transplanted for the fresh market. The Arkansas Valley growing area which is centered in Otero county produces 2,000 A of field seeded onions mostly for the fresh market. The Western Slope area includes Delta, Mesa and Montrose counties, and produces 2,000 A of hard yellow storage onion from seed.

Colorado growers use long day onions which begin to bulb in mid-summer. A few short day onions are planted in Colorado to produce pearl onions, using Crystal Wax or White Barletta varieties.

A sweet Spanish onion such as Colorado #6 is used for direct seeding in the Arkansas Valley and for transplanting in Northern Colorado. A hard yellow storage onion such as Brown Beauty, Yula or Vega is used for field seeding in Northern Colorado and on the Western Slope. Some onion sets are produced in Northern Colorado, mostly of the variety Ebenezer.

**Bedding**

For ease of culturing, onions are often planted on beds. The ground is plowed in the fall, fertilized and worked down with a mulcher or disk then

listed into rough beds which are mellowed by frost action.

In the spring, just prior to planting, the rough beds are smoothed with a bed shaper or dragged off and planted. Bed width may be 44 inches for twin rows or 22 inches for single row beds.

Whether beds are made in the fall, spring or not at all, the soil must be left in such a state that it doesn't blow.

**Fumigation**

When a field has disease, insect, nematode and weed problems, it is sometimes more economical to fumigate than to try and treat each pest with a different chemical. Fumigation is still not a standard commercial practice for onions grown in Colorado although it is becoming more popular. It is usually done in conjunction with preparing the rough beds in the fall. There must be enough moisture in the soil to seal and hold the fumigant.

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In the spring the tops of these ridges are bladed off and the onion seed planted directly over the injection slot in the fumigated soil.

## Herbicides

There are three herbicides recommended for onions in Colorado, Dacthal (DCPA), Brominal (bromoxynil), and Goal (oxyfluorfen). Fusilade has been used under a section 18 exemption.

**Dacthal**—7.5 to 10 pounds actual ingredient/A. Apply Dacthal after planting and soil incorporate 0.5 to .75 inches deep. Use equipment that provides thorough soil mixing of the chemicals. Flower-of-an-hour (*Hibiscus spp.*) and possibly sunflower, appear resistant to Dacthal. Use higher rate on heavier textured soil.

The amount of Dacthal onions will tolerate without injury varies with variety soil pH and soil type.

**Brominal**—0.25 to 0.38 pound actual ingredient/A. Apply Brominal on a broadcast basis in 50 to 70 gallons of water per acre when onions have two to five true leaves. Some crop injury may occur. It should be applied during bright sunlight when the foliage is dry, humidity low and temperature near 80° F.

**Goal**—0.12 to 0.25 pound actual ingredient/A. Apply Goal to onions with two or more true leaves, when broadleaf weeds are small. Use 50 or more gallons of water per acre. Repeat applications may be necessary. Apply no more than 0.5 pounds per acre total per season.

## Planting

Onion seed are planted in rows approximately 20 inches apart. When two rows are planted on a 40-inch bed they are generally 12 to 18 inches apart. Seed are planted 1 inch deep and 2 to 4 inches apart. The spacing in the row influences the size of the bulbs. The seed used per acre is calculated after the spacing is determined and will range from 2 to 3 pounds per acre (8,500 seed per oz.).

Onion seed may be planted any time after the first of January; however, they will not germinate until April in most locations; therefore, there is little to be gained by planting before March.

Onion transplants and sets are usually planted in April. When planted earlier, cool weather may induce them to produce seed stalks rather than onion bulbs. The usual method for sticking transplants is to furrow the field with 24-inch furrows and start the water down the furrows. As soon as the water subs 2 inches up the side of the furrow, onions are hand set 4 inches apart into wet soil just above the water level. During the season the furrow is moved away from the row until it is equidistant between the rows. Mechanical transplanters are becoming more popular.

## Culture

Cultivation begins as soon as onions can be rowed out by the tractor operator. Many types of

equipment are used for cultivating; however, the standard method uses disks, knives, duck feet and furrow openers. The disks are placed on either side of the onion rows to cut the crust. A knife is mounted behind each disk to undercut weed on either side of the row and fill in the furrows made by the disks. A single duck foot might be centered in the furrow to undercut weeds, followed by a furrow opener which remakes the ditch for the next irrigation.

It is generally necessary to send a hoeing crew through the field at least once to eliminate weeds which escaped the herbicides. Onions are now precision planted to the final stand which obviates the need for thinning.

## Insect Control

Onion thrips feed on developing onion leaves causing scarring. Heavy populations can reduce yields, particularly after bulbing. Transplants coming in from out-of-state can be a source of infection and should be dipped in an insecticide if thrips are observed. Some strains of thrips have proven to be resistant to organophosphorus insecticides.

**Table 1: Insecticide recommendations.**

Thrips Control	Days to Harvest	Rate	Remarks*
Mevinphos (Phosdrin)	1	0.25-0.5	R, O
Methomyl (Lannate, Nudrin)	7	0.5	R
Diazinon	10	0.5	O
Methyl parathion (Pencap-M)	15	0.5	R, O
Ethyl parathion	15	0.25	R, O
Guthion	28	0.5-0.75	R, O

\*R—restricted, C—carbamate insecticide, O—organophosphorus insecticide

The seed corn maggot is more prominent than the onion maggot. Most maggot infestation occurs in onions which have been previously wounded or diseased. Problems tend to be worse on moist soil high in organic matter.

The only product currently being manufactured, which is cleared for maggot control, is Diazinon. This may be used as either granules or liquid.

## Diseases

**Damping off** (caused by *Pythium*, *Fusarium* and *Rhizoctonia* species) may appear in circular to irregular shaped areas within fields, or on individual plants between healthy appearing ones. Seedlings can be attacked and killed before or after emergence as their root systems are destroyed.

**Pink root** (caused by *Pyrenochaeta terrestris*) symptoms occur on roots which turn pink or yellowish-brown, soon shrivel and die. Roots may persist as red, purple or dark brown remnants.

Leaves of severely infected plants may exhibit tip dieback.

**Nematodes** feed on root systems and basal plates, reducing their vigor and cause rot from secondary invaders. Bulbs may also be soft, swollen and misshapened.

**Downy mildew** (caused by *Peronospora destructor*) produces a white to purplish mold on older leaves during cool, moist weather. The spots gradually become tan or white.

**Purple blotch** (caused by *Alternaria porri*) produces brown to purplish lesions with a dark margin and yellow center on older leaves near the end of the season. Infection then spreads to younger foliage, and occasionally the neck region and bulb.

**Botrytis neck rot** (caused by *Botrytis* species) produces white specks on the foliage late in the season. A gray mold with black sclerotia form on rotting scales at harvest and during storage.

Disease management recommendations rely upon crop rotation, pesticides, clean seed and transplants, good seedbed preparation, and other production guidelines that reduce plant stress.

## Harvesting

*Storage onions* should be undercut when 80 percent of the tops are down. The onions are then allowed to cure until the tops have thoroughly dried after which the harvester, which may be a potato digger, lifts the onions, sifts out the soil and either windrows them or loads them directly into bins, bags, or bulk bodied trucks. In some cases the onions are run across a topping table to remove tops before they leave the harvester. This table consists of a series of pinching rolls which catch the tops and pinch them off.

*Transplanted onions* are generally sweet Spanish types and will not stand the abuse metered out by a machine harvester. They are undercut just as the storage onions and while the tops are still strong enough to pull up the onions, they are hand topped. This is done by grabbing a handful of tops and severing the tops close to the bulbs with a

pair of clippers. Bulbs fall into wire baskets and then are transferred into burlap bags. Bags are left standing in the field to cure before being taken to the packing sheds where they are moved directly into marketing channels.

## Storage

It is assumed that all onions going into storage are contaminated with *Botrytis* spores. If onions are well cured and dry when they come into storage, and promptly cooled, there is little danger of *Botrytis* rot. However, adverse weather conditions sometimes exist and the onions coming into storage are neither cured or dry. This allows the spores to germinate and grow down the neck into the center of the onion where they proceed to cause internal rot. This can be a serious problem because it is often impossible to tell whether an onion has internal rot without cutting it open.

When onions come into storage in less than a cured condition, they should be blown with low humidity air to dry them off. The best way to lower humidity of the air is by heating it and many storages are equipped to heat the air before it is blown through the onion piles. The piles are blown with warm air at 100° F until the pile ceases to give off moisture. This is determined by a psychrometer and psychrometric chart by comparing the moisture of the outside air with that of the air coming off the top of the pile. When these moistures are equal, it is time to cool the pile down to a 34 to 38° F storage temperature. This is done by blowing outside air through the pile during the night whenever the outside air is 10° or more below the temperature of the onions. After 30 days, the pile should be at 34 to 38° F and will require blowing only two to three hours per day to maintain this temperature.

It is all right to allow cold air to contact warm onions, but not the other way around. When this happens moisture condenses on the onions and this must be evaporated quickly by additional blowing with cold air.

**Table 2: Disease control recommendations.**

Disease	Pesticide	Application Rate (acre)	Application frequency (days)	Days before harvest
Botrytis Neck Rot	Dithane FZ	0.8-2.4 qt	7	7
	Bravo 500	2.25-4.25 pt	7-10	7
	Dithane M45	2-3 lb	7	7
	Maneb 80	1.5-2 lb	7	
	Dyrene 50	2-6 lb	4-10	
	Dithane M22 Sp.	1-3 lb	7	
	Kocide Maneb	1.2-1.6 qt	7-10	7
	Bravo W 75	1.5-3 lb	7-10	7
	Manzate D	1.5 lb	7	
	Manzate 200	2-3 lb	7	7
Damping off	Rovral	1.5 lb	7	7
	Arasan 50 (Thiram 42 S)	8 oz/100 lb	Seed treatment	
Downy mildew	Dithane FZ	0.8-2.4 qt	7	
	Bravo 500	2.25-4.25 pt	7-10	7
	Dithane M45	2-3 lb	7	7
	Maneb 80	1.5-2 lb	7	
	Dithane M22 Sp.	1-3 lb	7	
	Kocide Maneb	1.2-1.6 qt	7-10	
	Bravo W 75	1.5-3 lb	7-10	
	Manzate D	1.5 lb	7	
	Manzate 200	2-3 lb	7	7
	Phaltan 50	4 lb	7	7-14
	Kocide 101, 606	2 lb, 2-6 pt	7-10	
	Cit Cop 5 E	3.0 pt	As needed	
	Tri-Basic Copper	1.5-2.0 qt	7-10	
	Captan 50	2.0 lb	7-10	
	Ridomil MZ 58	1.5-2 lb	14	7
Nematodes	Vapam	40-100 gal	Preplant, aerate 7 days	
	Telone II	9-15 gal	Preplant, aerate 7-14 days	
	Telone C-17	10-17 gal	Preplant, aerate 7-14 days	
	Vorlex	12.5-20 gal	Preplant, aerate 14 days	
Pink Root	Telone C-17	24-27.5 gal	Preplant, aerate 14 days	
	*Vorlex	12.5-20 gal	Preplant, aerate 14 days	
Purple Blotch	Phalatan 50	4 lb	7	7-14
	Dithane M45	2-3 lb	7	7
	Maneb 80	1.5-2 lb	7	
	Dyrene 50	2-6 lb	4-10	
	Dithane M22 Sp.	1-3 lb	7	
	Kocide Maneb	1.2-1.6 qt	7-10	
	Kocide 101, 606	2 lb, 2-6 pt	7-10	
	Bravo 500	2.45-4.25 pt	7-10	7
	Bravo W75	1.5-3 lb	7-10	7
	Manzate D	1.5 lb	7	
	Manzate 200	2-3 lb	7	7
	Difolatan 4F, 80	2.5 pt, 1.5 lb	7-10	
	Captan 50	2.0 lb	7-10	
Dithane FZ	0.8-2.4 qt	7		
Rovral	1.5 lb	7	7	

\*Suppression only