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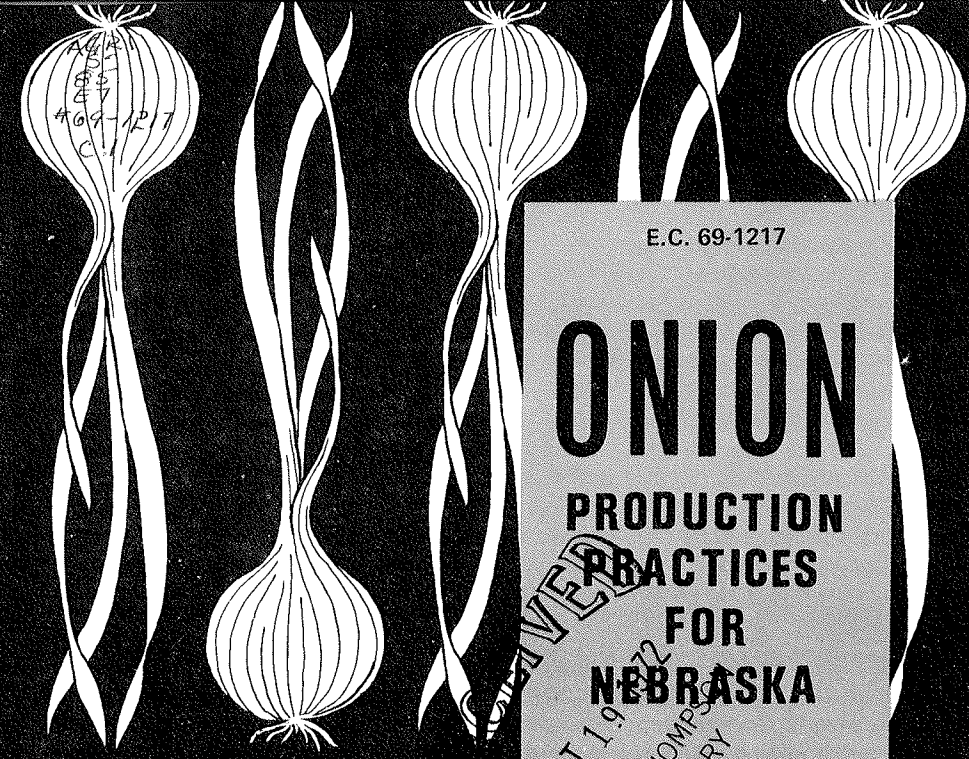

E.C. 69-1217

ONION

PRODUCTION PRACTICES FOR NEBRASKA

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ONION PRODUCTION PRACTICES FOR NEBRASKA

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Onions are a cool season crop. Generally, the best average temperature for their growth is from 55-75°F, with a low of 45° and a high of 85°.

In Nebraska, the earliest planting date is the date of first normal occurrence of 41°F and the latest date is about 45 days before first normal occurrence of 70°F (Table 1).

The earliest date of harvest is 63 days after the first normal occurrence of 70°F (when bulbing occurs). The latest harvest is on the date of 50% probability of occurrence of 32°F.

Onions are a long season crop. The bulb is the most important part to the grower and consumer. Bulb formation is determined mainly by day length, although temperature is also important. Because of the long growing days in Nebraska, temperature becomes the main factor affecting bulb formation. Leaf growth is essential before bulb formation takes place. Consequently, the earlier the seed is planted the better the chance for the formation of more leaves.

Table 1. Mean temperatures and day lengths relative to planting dates and bulb initiation in Nebraska.

Date	Hours of daylight	Mean daily temperature		
		Lincoln	North Platte	Scottsbluff
March 20	12.2	40[a]	37	36
April 1	12.6	46	43[a]	40
10	13.0	50	47	44[a]
20	13.5	54	51	49
May 1	13.9	58	54	52
10	14.4	60	57	55
20	14.7	63	60	57
June 1	14.9	67	64	61
10	15.1	70[b]	67	65
20	15.1	74	71[b]	69
July 1	15.0	77	74	72[b]

a/ Early planting date

b/ Approximate date bulb begins to grow. Latest date for planting is about 45 days earlier

Varieties

Colorado No. 6, Valencia and Amigo are recommended for large processing onions (3" diameter and larger). New hybrids and varieties are being studied. These varieties, plus Brown Beauty, Bronze Perfection, Fiesta and selections of Southport White Globe also are adapted for the fresh market (2" to 3" onions).

1/Assistant Professor, Associate Professor and Assistant Professor of Horticulture respectively.

2/Extension Horticulturist.

Fertilizers

A soil pH of 6-6.5 is best for onions. However, properly fertilized soils with higher pH produce good onions. Application of liberal amounts (15 to 30 ton/A) of manure to the crop previous to onions is desirable. Onions require 80-100 lbs. of N/A, 60-80 lbs. P_2O_5/A and 60-80 lbs. K_2O/A to produce top yields.

Recommended amounts of fertilizers should be applied according to soil tests and as shown in Table 2.

Table 2. Recommended amounts of fertilizers according to soil tests.

Residual Nitrate		Phosphorus (P_2O_5)		Potassium (K_2O)	
Soil test	Lbs./A	Soil test	Lbs./A	Soil test	Lbs./A
		ppm		ppm	
Very low	80–120	0–5	100	<40	120
Low	60–80	6–15	80	40–75	80
Medium	40–60	16–25	60	75–150	40
High	0–40	26–30	40	125–150	0
		30>	0	150>	0

Knowledge of previously grown crop helps in estimating amounts of fertilizers needed. If zinc deficiency was a problem in the previous crop, it could be even more serious with onions. In this case, application of 5 to 10 lbs. of zinc sulfate/A is desirable. The fertilizer is broadcast after plowing and is disked in.

All the phosphate and half the nitrogen should be plowed or disked down before planting. Preplant herbicide should also be disked down at this time. After the plants develop 3-4 true leaves, sidedress with the additional amount of required nitrogen. Potassium, magnesium, lime and boron levels in Nebraska soils are generally adequate.

Weed Control

Onions grow slowly at first. They cannot compete with weeds so fields must be clean. Herbicides or shallow mechanical cultivation, if needed, can be used to clean fields. A preplant or preemergence herbicide application is essential to give onions a head start on weeds.

Dacthal at the rate of 10 lbs./A active or 15 lbs./A of 75% WP in 40-60 gal. of water is recommended. It is combined in the soil to a depth of 1 to 3 inches by disking of preplant applications or roto-tilling with postplant but preemergence applications. Dacthal is not effective in controlling established weeds or weeds that have germinated. Therefore, it is better used as preemergence spray on freshly worked soil. For transplants or sets, apply 12 lbs./A Dacthal (16 lbs. 75% WP) immediately after field setting.

Chloro-IPC at 6 lbs./A (1.5 gals. liquid concentrate) may be used during the growing season if *purslane* is a problem.

Seed Bed Preparation

A fertile, well-drained loam, sandy loam or silty loam is ideal for onion production. Avoid heavy or lighter soils. Avoid fields in which weeds were a

major problem during the previous year or on which Atrazine or related residual herbicides were used.

The land should be plowed 5-7" deep, disked and harrowed until free of clods. Preplant herbicide should be applied before disking. It is essential to have a smooth seed bed for maximum germination and a good stand. Corn stalks can cause problems in preparing a good seed bed for onions, especially in dry years.

Planting Equipment

Onions can be planted with standard sugar beet, bean or corn surface planters. Flex-type planters are desirable. A regular monogerm sugar beet plate can be used with every other hole plugged. Blank plates can be notched with 25 to 28 notches 3/16 to 1/4 inch in diameter for most planters. The special plate is then fitted into a ring plate and the drill adjusted to the correct seeding rate. Cone-seeder attachments can be obtained for most planters. They require no special plates and are easily set for seeding rates.

Seeding and Spacing

Distance between rows should be between 16" and 22" and adjusted to fit cultivation and harvesting equipment. Spacing between plants should be 3-4" if large onions are desired for processing.

For the fresh market, 8 to 10 plants per foot of row are desirable. Use 2-3 lbs./A of seed adjusted to percent of seed germination. A good stand is essential for a good crop. If the stand is not good, do not expect that more fertilizer or more irrigation will compensate. It is better to have a good stand and thin to the desired distance than to replant.

If preplant application was not used, preemergence but postplant herbicide should be applied and worked into the soil before irrigating. Soil can be ditched for irrigation in the same operation.

Irrigation

Adequate moisture is essential for seed germination. Therefore, moisture must be continually provided. Early watering is also important for the activation of fertilizer and herbicides.

Once plants have started to grow, they must never suffer from lack of water. Requirements for water should be met with the combination of rainfall and irrigation. Frequent and light irrigations (1 to 2 in.) are essential since onions are shallow-rooted. Either sprinkler or ditch irrigation can be used. Six to ten irrigations may be required during a season. Stop irrigating when 20 to 25% of the plants show maturity by kinking of the tops.

Insect Control

Onion Thrips: At first appearance, make two or more applications 7-10 days apart with one of these materials:

1. Diazinon Ag. 500: 1 pint (4 lb./gal. EC) per acre in 20-25 gal. of water.
2. Malathion: 1.5 pints of 57% EC/acre.
3. Guthion: 2-3 pints 25% special concentrate. *(By experienced commercial applicators only.)*

4. Parathion: 1 pint 25% EC; 2 lbs. 15% WP. *(By experienced commercial applicators only.)*

Onion Maggot: If onion maggot is in the soil, drench the furrow at time of planting, using 1 qt./A of Diazinon 4 lbs./gal. EC; or place granular material in the seed furrow, using 1.5 lbs./A Ethion (30 lbs. of 5% granular); or Dasanit (10 lbs. 10% granular) which contains Thiram for smut control.

Disease Control

Purple blotch (Alternaria porri) can occur in eastern and central Nebraska when the average temperature is 70-75°F, with a relative humidity above 70% or following heavy rains or irrigation. *Downy mildew (Peronospora destructor)* may develop during cool, wet weather. *Purple blotch* appears as white flecks on the leaves which finally develop into oval or oblong purple, brown or black lesions under favorable conditions. *Downy mildew* occurs as a frosty or fibrous white growth on leaves and bulbs.

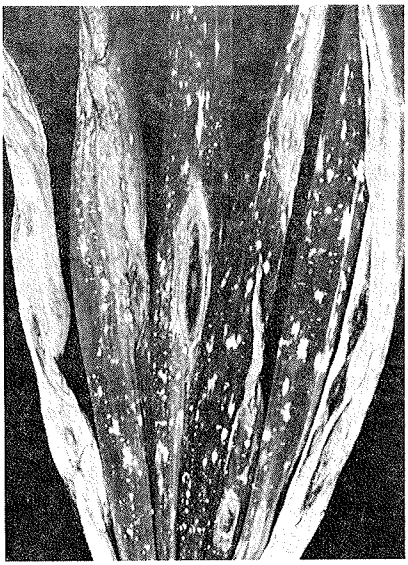
Soil-borne diseases such as Fusarium may occur in some fields in some years and cause bulb rot in storage. Rotation and the use of resistant varieties are the only control measures for these diseases.

The following chemicals are used for controlling leaf diseases such as *purple blotch* and *downy mildew:*

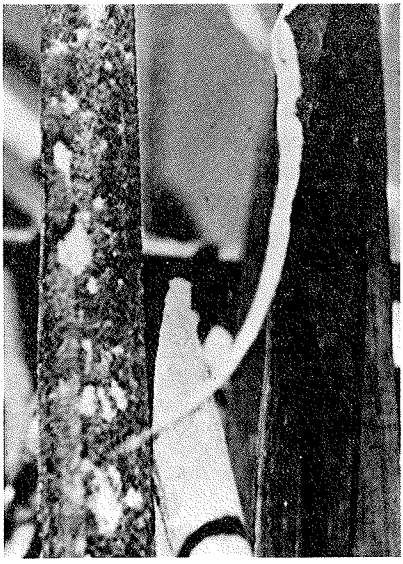
1. Maneb (Manzate or Dithane M-22) 2-3 lbs. active/A.
2. Maneb + Zinc (Manzate D or Dithane M 45) 2-3 lbs./A.
3. Zineb (Parzate C or Dithane Z-78) 2-3 lbs./A.
4. Dyrene, 1.5 lbs. Active/A. Do not use on "green" onions.

Six to eight applications of one of the previously mentioned chemicals may be necessary in some seasons.

A good spreader-sticker is recommended; this is usually indicated on the manufacturer's label. An insecticide could be added in the early and mid-season sprays.



Purple blotch symptoms on onion foliage.



Downy mildew symptoms on onion foliage. Mechanically topped onions.

Clean onion fields can be obtained with the use of herbicides.

Harvesting

Maturity of onions can be determined as follows:

1. The neck of the plant dries and the tops become kinked.
2. The roots stop growth from the stem plate and become dry.
3. Drying and loosening of the outer scales may occur.
4. Darker color develops in the outer scales in yellow varieties.

Generally, all plants in the field do not mature at the same time and a combination of previous indicators should be used to determine maturity. Kinking of the tops is the best indicator providing a disease is not responsible for its occurrence.

Usually when 25% to 50% of the tops have kinked, most varieties are ready to harvest. If the soil has become dry, a light irrigation 2 to 3 days before harvest may facilitate operations.

If hand labor is to be used for harvesting, hand pull or machine lift onions and place them in wind-rows (2 to 4 rows together) for curing. *Curing* develops firm scales and dry necks which reduce moisture loss from bulbs and loss due to rot organisms.

If onions are to be marketed immediately, curing of 3 to 4 days may be sufficient. If onions are to be stored, curing until the necks of the bulbs are dry and the outer 2 to 3 scales are dry and firm is essential. This may require 2 to 4 weeks depending upon temperature (60 to 80°F) and relative humidity (below 80%). Warm, dry days hasten curing.

Topping is the next operation. Onions may be hand topped by clipping the necks to a length of 1 to 2 inches with shears. Topping machines are available.

The onions are then placed in crates or sacks and hauled to grading or storage areas.

Complete mechanization of harvesting operations is possible if labor cost or scarcity and production volume warrant the costs of machinery and facilities. With mechanical harvesting, onions may be *topped* (1 to 3 inch neck) with a rotary mower or flail-type topper (modified potato vine beater).

Following topping, the onions are lifted with a potato digger and 2 to 4 rows are windrowed.

Field curing 2 to 3 days before further handling of the onions may be desirable. Mechanical indirect tractor mounted or pull-type potato *harvesters* may then be used *to pick up the bulbs* and place them in bulk trucks, pallets or 100 lb. mesh sacks. The onions are then hauled to a grading area for immediate marketing or to a storage area for curing and long-time storage for future marketing.

Curing with forced air ventilation can be accomplished when onions are placed in bulk storage bins with slatted false floors. Onions can be piled 6 to 8 feet high. Air at a volume of 1.5 cfm per cubic foot of onions should be ducted through the slatted floor and up through the onions.

If the air temperature is 50°F or higher, curing will occur in 3 to 6 weeks. Enclosed bins or special ducting of air are necessary if the onions are left in pallets. If the air temperature drops below 50°F, heaters will be necessary to raise the air temperature. The curing period can be shortened by heating the air to 105 to 115°F for periods of 16 to 24 hours every 2 to 3 days.

Storage

Many types of farm buildings may be converted to temporary or permanent modern onion storage. The best storage temperature for onions is 33°F (with 50 to 70% relative humidity). The structure needs to be insulated and/or heated to maintain this temperature during the storage period (October to March 1). A forced air ventilation system to provide optimum curing and storage conditions is essential.

After storage curing, drop the storage temperature slowly to 33°F and reduce the air volume to 0.75 cfm in the ventilation system. Blend outdoor and indoor air to maintain a relative humidity of 50 to 70%.

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