ONIONS - PRODUCTION, DISEASES AND STORAGE

William K. Wahlert
Dessert Seed Company, Nyssa, Oregon

There are over five hundred species in the onion family but there are only a few of these that have any commerical value. There is only one in which you and I have any interest. This is the one that is going to put dollars into your pockets, and, I hope, mine. Getting this onion to a marketable position presents a number of problems that start before the seed is planted and does not end until it is on the consumers table. These problems are almost the same where ever onions are grown so yours are undoubtedly very close to the ones that we have in the Eastern Oregon and Idaho onion growing areas.

A good seed bed, well prepared and properly fertilized, is a must. Good seed from a reliable source is the smallest expense in any onion crop. A great number of us, including me, has had to learn this the hard way. The costs of fertilizer, planting, weeding and cultivating are the same on a poor crop as on a good one - sometimes more. So start with the best seed that you can get and of a variety that has the qualities that you want or need. In an effort to assist growers to obtain more uniform stands, a number of seed companies are now sizing their onion seed to tolerances with a sixty-fourth of an inch. Such seed works beautifully in the precision type planters such as the Milton and Ventura types. It helps considerably too in the Planet Jr. or similar type machines. Pelleted onion seed is being used more each year. The precision planters do an almost perfect job of spacing pelleted seed. I observed a number of fields where the onions were spaced at two inches. Planted in this manner each plant has ample room to grow and develop into a large marketable bulb. In most years there isn't much of a market for small and medium sized bulbs and precision planting is rapidly replacing the old hit and miss operation.

How much fertilizer to apply, when, and what formula? This, of course, depends largely on the type of soil, previous crops, carry-over from the previous year and the capability or productivity of the soil. A number of formulations are being used, but the most popular in the Nyssa-Ontario District of Eastern Oregon is a 10-16-8 mix applied broadcast before planting at the rate of from 800 to 1000 pounds per acre. North of Ontario on the Dead-Ox Flat, some of the growers apply as much as a ton to the acre. To me, this seems to be too heavy an application, and that they couldn't grow an onion to maturity. Perhaps it is like the bumble bee, who is built in such a way that aerodynamically he cannot fly. But, not knowing this, goes ahead and flies anyway. I know that the growers on Dead-Ox Flat are producing top quality onions year after year. Most of our growers side-dress with an additional forty to sixty units of nitrogen during the season. Here is something that should be considered carefully - that is the time of making this application. Nitrogen applied too late in the season can cause too rapid a growth and result in a soft, blown-up bulb that is difficult to mature and will not keep in storage.

The greatest expense that an onion grower has is the battle of the weeds. The Malheur Experiment Station has been doing considerable work with chemicals and has found that Randox Liquid applied immediately after planting at the rate of six pounds of actual material for full coverage gives excellent control on grasses. Now, do not confuse Randox Liquid with granular Randox or Randox T. Some of the fellows down our way had some sad experiences this past year with

granular Randox. It controlled the weeds all right, but there weren't any onions either. Another material that really looks promising is Dacthol. This material is applied preplant by spraying it on and working it into the top two inches of soil. At the last conversation with Mr. Hoffman of the Malheur station, Dacthol had not yet been released for use on onions but they had hopes of doing this shortly. While this material looks good, there are no recommendations on its use yet. Pre-emergence weed control has proven to give results in controlling the early weeds. Aero-cynate is still used for this as well as for later weed control. We have used an oil spray for pre-emergence and have had excellent results. Stoddard solvent, Shell Ten, or Richfield One can be used. We used Stoddard solvent at the rate of thirty gallons per acre at forty pounds pressure applied directly over the row just as the first onion appeared at ground level. The greatest difficulty with applying a spray is that when the time is right the wind blows. From what I hear, you have a few gentle breezes here in the spring. For later weed control, Liquid Randox, Aero-cynate, Chloro-IPC and oils, when properly applied, give good control. There has been considerable work performed on the use of flaming with propane burners in some of the southern states. The people doing this work claim that onions can be flamed a number of times with no apparent reduction in yield or quality of the onion crop. The first flaming is a pre-emergence, the next when the plants are about three inches high. At this stage, they can be burned back to the ground and will recover. Any successive flamings are applied from the side of the plants and the flame directed at the base of the onion right at ground level. We have used flaming as a do or die operation in an attempt to salvage a field that was being taken with weeds. Not knowing exactly what we were doing, we did not start early enough in the season nor did we follow it up with later burnings. This next season, we are going to try more of it. We have a set of burners ordered and will be ready for the weeds. Regardless of whether chemicals or a flame is used, the operation has to be performed while the weeds are small. The larger they are, the more difficult they are to kill. When they get too large, then of course, comes that costly hand weeding operation.

There is a natural tendency to over-irrigate an onion crop. An onion requires sufficient moisture to make a steady growth but it doesn't have to be drowned every four or five days. Excessive irrigations early in the season lay the ground-work for trouble later on. It seals the ground and keeps the roots from obtaining oxygen that they need for a good healthy growth and also tends to keep the roots shallow and near the surface. It sets up ideal conditions for downey mildew and purple blotch too. Late irrigations can cause trouble too. While a number of growers practice irrigation after August first, the recommendations of agriculturists are to cut the water around this date and let the onions mature normally. Late irrigations set the stage for storage diseases. Onions that have been watered too late are difficult to mature and are usually soft and spongy and will not keep in storage for very long.

I believe that we have most of the onion diseases in the book in the Snake River Valley. We are fortunate, however, that we are not faced with serious outbreaks of them each year. Pink-root, a fungus disease that destroys the onion roots, seems to be present in varying degrees and until the past few years has not presented too much of a problem. It is on the increase though, and plant breeders, both those employed by private companies and by state and federal agencies, are working on this. The Malheur Experiment Station, cooperating with the United States Department of Agriculture, has a pink-root plot where they are testing varieties for resistance. Our company maintains a pink-root plot just north of Nyssa where we are testing new in-bred lines

and new hybrids each year. Some of the chemical manufacturing companies are working on soil fumigants in an effort to control the pink-root fungus. Some of these are being tested by the Oregon State University. Most plant breeders feel that resistance is the answer to this particular problem. Dr. Henry A. Jones, who heads our research and development department, was with the department of agriculture at Beltsville, Maryland for twenty years;solved the pink-root problem in Texas by developing resistant in-bred lines and the hybrid onion, Granex, which put Texas back into the business of growing onions. Dr. Jones is working on developing resistance in the northern type onions and feels that within the next two or three years that we will have seed available for distribution.

Slides: Downey Mildew
PRR Selections
New Line

The Fusarium rots which attack the base of the onion bulbs seem to follow hand in hand with pink-root. After the pink-root fungus has destroyed the roots, it leaves the door open for infection from Fusarium. Until someone comes up with a resistant onion or a chemist makes a suitable fungicide or fumigant, about the only control for pink-root is a rotation with crops that are not hosts to the fungus.

Purple blotch and mildew show up under conditions of high humidity. Both of these propogate from spores which are air-borne and under the right conditions can spread like wild-fire. Purple blotch has not been too serious in the Snake River Valley but has on occasion caused losses in some fields. This past year, we had an outbreak of downey mildew, mostly on the Oregon side of the river near Weiser. This showed up late in the season in plantings of onions that were to be used for seed production. It did some damage in a few fields of commercial onions but not as seriously as in the seed field. The spores of purple blotch will live over in the soil and on plant residue. Mildew lives only on the plant tissue. To control both of these, careful control of irrigation to regulate humidity is the first step. If an outbreak of either occurs, an application of a fungicidal dust such as Captan or Dithane will help to keep them in check. As a precaution against mildew, it is best to isolate commercial onion fields from seed production fields.

Botryis, or neck-rot, is a fungus that develops through improper handling, curing and storing of bulbs. This takes us back to those late irrigations and late applications of nitrogen. Avoiding that temptation to give the growing crop just a little more nitrogen and one more shot of water late in the season will go a long way in preventing heavy losses from neck-rot. An onion is not a lily, even if it does belong to the lily family, and the ground does not need to be saturated with water for it to make the best growth. It certainly does need to mature naturally in order to cure down properly and keep any length of time in storage. For the past five years, the Malheur Experiment Station has been conducting tests on neck-rot and the Oregon State University will probably publish their findings before too long. In talking to Mr. Hoffman of the station, the general feeling among the group conducting the tests is that proper curing in the field is the essential thing. Onions can be artificially cured but it would be expensive to put up an adequate building with the proper heating and ventilating equipment.

Sourskin, the result of bacterial action, is usually more prevalent when the onions have a loose, fluffy scale that permits the entrance of moisture. Here again, improper curing in the field is generally the cause.

Where ever there are onions, there are thrips. We are so used to them that we automatically spray or dust with DDT or any other insecticide that will do the job. Doing this helps control the onion maggot flies too. The maggot fly has been controlled through the use of ethion or Trithion applied in the furrow at planting time. Some of the entomologists feel that we should be careful and not overdo the use of these chemicals as it might result in a breed of flies that would be immune to them such as has resulted in the use of DDt for the control of house flies.

We have used fly-baits on different occasions to help control maggot flies. We have done this in an area where we did not want to use or could not use a spray or dust such as around our onion breeding cages where we have bees working and could not take a chance of drift of the insecticides killing them. We use these baits quite often early in the spring before the onions emerge by scattering the pellets in the grass along the fence rows and ditches.

We have another problem staring us in the face - nematodes or eel-worms. We have had them in our area for a number of years but really never considered them a major problem. It was not until it was discovered that we had a few scattered fields that has the sugar-beet nematode that we started to see what else we had. We have root-knot nematode and the stem and bulb nematode too. The best control is prevention. Good farming practices of weed control and crop rotation are essential. There are many weeds that are host plants to the root-knot nematode: among them are the pigweeds and dandelions. This nematode will work on onions and really raises thunder with potatoes. It works on sugar beets too, and uses the beet as a host plant but does not do too much damage to them. The stem and bulb nematode will work on onions and garlic and in some areas has resulted in a practically total crop loss. This nematode can be transported in onion bulbs, plants and garlic cloves. If you suspicion that you have the stem and bulb nematode, don't haul your cull onions onto your fields. Better to burn them. If you find that you do have any of the three species just mentioned, do not plant any onions, garlic or leek but go into at least a five year program of grain or corn.

The high cost and shortage of hand labor has created a great deal of interest in mechanical harvesting and bulk storage of onions. For a number of years, mechanical harvesters of the Brunner type and the Airflow type have been used in the eastern part of the United States quite successfully. These types, with modifications have been used with varying degrees of success, or should I say unsuccess, in our area. On the hard type onions, they do very well but on Spanish types, the results vary from poor to fairly good. The machines that we have observed in operation do not have the capacity to handle the large onions and heavy yields that we obtain in our valley. The machines that have been tried so far are too rough in handling the bulbs and result in too much bruising and excessive removal of the outer scales. In some fields, the machines just could not do a satisfactory job of removing the tops. There are a number of persons working on different designs for an onion topper and harvester and without a doubt, within a couple of years there will be one made that will do the entire operation satisfactorily. Over in the Lake Labish area north of Salem, Oregon the onion growers have been harvesting Yellow Globe Danvers by mechanical means for years. They lift and windrow the bulbs, let them cure and

then pick them up - tops and all - with a machine similar to a beet loader, place them in bulk boxes and haul them into storage. Some of the producers store their onions in the bulk boxes and some transfer them to racks. All that I have seen though, still had the tops on and these were not removed until they came out of storage. We have stored a few of our breeding bulbs with the tops on and have done this satisfactorily. Doc Franklin at the University of Idaho Experiment Station at Parma stored a large bulk bin of Spanish onions with the tops on with success. I'll come back to this in a moment.

I had an opportunity to see an operation in the field that was a real time and money saver. This company was using an Airflow topper, picking the bulbs up one bed at a time, topping them and transferring them into a bulk potato truck. The onions had been undercut and had dried down to the point where the tops were almost dry. The trucks would haul the onions to the storage building where they were transferred to regular onion crates on pallets. They let these stay outside until they were thoroughly dry before putting them into storage. The entire procedure was a little rough, but they were really rolling the onions out of the field.

Down at Tule Lake, California where the main onion crop is for dehydration, a simple harvesting method is used. The tops are whipped off with a rotary type beater; the onions left for two to three days, then lifted and windrowed. Left again for a day or so then bulked with a potato loader into trucks that haul them directly to the processing plant. This works fine for them as the onions are not stored for any length of time. We tried beating the tops off on a twenty-five acre field of White Globes near Weiser a year age. We still had to use a mechanical topper to finish the job as there were too many straggling leaves left.

Most of the onions in our valley are still stored in burlap bags even though it has been proven over the years that crate storage is superior. The only reason for this is the cost of other type storage. If a grower already has crates, you can quickly estimate what his investment is, he still has to make numerous trips to and from the field and the storage building. If he rents the crates he still has to get them to the field. In recent years, a number of our growers and some of the produce companies have switched over to skeleton box in which twenty-four or twenty-five field bags can be stored. While this is not as good as crate storage, it does offer better storage conditions than straight bag storage. There are a few growers that are using bulk boxes that will hold from 1000 to 1500 pounds of bulbs. Some of them have had difficulty in not being able to get adequate ventilation into the center of the boxes and have suffered some heavy losses. One of the produce companies stored a number of carloads in bulk apple boxes in an apple storage building where the temperature was held at a constant 34 degrees. This should have given him ideal storage conditions. Some of these boxes held about 500 pounds and some 1100 pounds. He had practically no loss in the smaller boxes but had an average of 20 percent decay in the large boxes. This man felt that if there had been some type of ventilator in the middle of those boxes that he would have had no more decay than in the smaller boxes.

Doc Franklin at the Parma Experiment Station, as I mentioned a few minutes ago, started a bulk storage experiment in the fall of 1960. He conducted this again this past season. At this time, Doc did not have the figures available on the onions that he has just removed from the bins but thought that they were comparable to the 1960 trials. The onions were stored in bins eight feet square

and ten feet high. Onions that had been mechanically topped were placed in one bin; in the other, onions that still had the tops on were placed. The bins are equipped with a ventilation system at the bottom so that air could be forced up through the onions. These bins are in a commerical storage and the air used was from inside the building. We conducted a similar experiment in cooperation with a dehydration company. The bin we constructed was twelve feet wide, twelve feet deep and thirty-six feet long. We had cross ventilation channels every four feet across the floor with a false floor in between the channels. We used White Globe onions and bulked them eleven feet deep. The onions were just a little damp when we placed them into the bin and we were somewhat sceptical and afraid that we would have some heavy losses. This was not the case, however. The onions went into the bin on October 10th and were removed January 20th. The loss from decay was only 2.50 percent but we did have a moisture loss of 8.34 percent. We had been advised that it would be necessary to have the fans on for long periods during each day to remove the moisture from sweating onions to prevent decay. After we were through with the experiment and had the final figures, the fellows from the dehydrator decided that it would not have been necessary to do this and that just a couple of hours each day would have been sufficient and that our moisture loss probably would not have been much over two percent. At the same time that we had the bulbs in the bin, we had a hundred bags on pallets in the warehouse. The loss from decay here was greater than in the bin - almost 6 percent; the moisture loss, however, was only three-fourths of one percent. The onions in the bag storage were really quite damp and would not have kept much longer. The onions from the bin were just as dry as they could be and would have stored easily for another six weeks.

Slides: Parma Storage

If I have been able to give you any information that will be helpful to you, I'm glad. It has been a pleasure to talk to you and I hope that next year that you raise so many onions and get such a good price for them that you will even smile when you pay your income tax.