

# Onion Production and Marketing in New Mexico



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## PREFACE

This publication was compiled as the proceedings for an onion conference conducted on March 6, 2002, in Las Cruces, N.M. The goal of the conference was to strengthen New Mexico's onion industry by presenting the latest technological and research-based information about onion production and marketing. The conference was sponsored by New Mexico State University and New Mexico Department of Agriculture.

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# Introduction

**Robert F. Bevacqua, Extension Vegetable Specialist, New Mexico State University**

There are 120 farms in New Mexico that produce onion for the commercial market. There also are 35 packing sheds that grade, bag, load and ship onions to national markets.

Onions were among the top 10 agricultural commodities in New Mexico for 2000. They were ranked seventh overall and generated \$32,764 in cash receipts. Growers produced more than 3.5 million hundredweight in 2000, up 7.8 percent from 1999. The rise in production is the result of an increase in harvested acreage from 7,300 in 1999 to 7,700 in 2000, and an increase in average yield from 450 to 460 hundredweight per acre. The primary production centers are in Dōna Ana and Luna counties with small acreages in Sierra, Chaves, Curry, and Hidalgo counties. The onions typically are planted in the fall or early spring and harvested during June, July and August. The onions are yellow, nonstorage types that go directly to national markets.

Market concerns are the principal constraint of New Mexico's onion industry. Farmers generally receive favorable prices and this leads to profitability in most years. Prices, however, are volatile and can change from month to month and year to year. For example, the crop's value fell 38 percent from \$53 million in 1999 to \$33 million in 2000. This explains why market issues, in response to grower requests, were an important theme for this conference. Speakers addressed marketing trends for onions, consumer concerns, exporting onions to new markets and the pros and cons of adopting a marketing order for onions in New Mexico.

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# IPM Strategy for Thrips on Onion

Brad Lewis, Entomology Specialist, New Mexico State University

By far the most common and damaging insect found on New Mexico onions is thrips. Two species, western flower thrips and onion thrips, are the most common species within the complex. Thrips are present throughout the year, with adults surviving the winter on weeds, overwintering crops (including alfalfa and onions) and ornamental trees and shrubs. Typically, early spring onions are infested primarily with western flower thrips. As temperatures increase, onion thrips begin migrating into the fields and may dominate the complex toward year's end.

Adult thrips insert eggs into the plant tissue. The nymphs move to their primary feeding location within the confined leaf area of the neck. Nymphs are yellow. Although they are visible without magnification, it is difficult to distinguish individual characteristics. Adults are winged and dark-colored. They can be found feeding on the leaves within the neck or on the plant's outer portions. The life cycle's length depends on temperature. During the summer, it is approximately two weeks or less. Thrips may lay as many as 300 eggs each. The large number of eggs coupled with the short life cycle contributes to rapid population buildups.

Feeding damage is indistinguishable between the two thrips species. The nymphs and adults puncture the epidermal layer of the leaves and then suck up the ruptured cellular contents. The ruptured epidermal layers result in tissue death and loss of photosynthetic area. As leaf size increases, damaged tissue takes on a silvery appearance. In cases of severe infestation, damaged leaves may die, significantly reducing bulb size and yield. Regional research has demonstrated that bulbing onions are particularly sensitive to thrips feeding, losing up to 20 percent of the yield. Onions normally are capable of recovering from thrips damage before bulbing;

feeding damage during sizing usually results in early neck collapse.

Several factors inherent in thrips biology contribute to potential insecticide resistance problems. Thrips have a high biotic potential; as the number of individuals increases, the chance of expressing a resistant mechanism in the population increases. Another factor is that their reproduction is primarily asexual reproduction (females producing females). Therefore, identical copies of insecticide-resistant clones are produced quickly in the population.

To minimize resistance problems, changes in insecticide classes should be incorporated in the spray regime. Insecticides applied to actively growing or to heavy populations may require more frequent applications to suppress thrips. After an insecticide application, thrips eggs continue to hatch, with larvae moving to the wax layer on onion leaves. All insecticide applications should include a wetting agent.

Natural rainfall is one of the best control factors. In years when frequent rains occur, thrips control is relatively good. But in dry years, available control measures are less effective. However, the degree of control that can be achieved by insecticides is beneficial to crop yields.

Foliage characteristics affect the extent of thrips damage. Onion varieties with glossy (nonglaucous) foliage seem to have less damage than the waxy, blue (glaucous) foliage types. We have been able to control thrips on the fall-planted, glaucous foliage types like 'Buffalo'. But for spring planting, we suggest varieties that have dark green, nonglaucous foliage. In fact, most varieties that produce well in New Mexico are the nonglaucous types, probably because they are less attractive to thrips.

Regional research (Sanderson, 1995) has demonstrated that thrips feeding has the potential to significantly reduce onion yields. This reduction is in the form of smaller onions and occurs from feeding activity after the bulbing stage. Western flower thrips and onion thrips dominate the thrips species complex in southern New Mexico onions. Although it is uncertain what determines which species is present during specific parts of the season, high temperatures and low humidity tend to favor western flower thrips (Kisha, 1977).

Biological control of thrips and development of resistant or tolerant onion varieties have not proven practical or reliable. Insecticide use is currently the primary method of reducing thrips populations in onions. Successful control continues to challenge onion producers and consultants. Factors that may contribute to inconsistency in regional thrips control include potential insecticide resistance, unknown thrips species at time of application, and poor insecticide application methods.

A new class of insecticides has not been registered for thrips control in onions in the past 12 years. Insecticides and classes currently registered for use on New Mexico onions are primarily limited to numerous pyrethroids (Ammo 2.5, Ambush, Mustang 1.5EW, Pounce 3.2, Fury, Warrior etc.), one carbamate (Lannate) and one organophosphate (PennCap M). Pyrethroids, the last insecticide class registered, is the most widespread insecticide class used for thrips control in onions. Considering thrips' high biotic potential and their continued exposure to a limited number of insecticides, it is surprising that adequate control is achieved in the majority of the fields.

Local and regional field and laboratory research has helped define the most effective method of controlling thrips in southern New Mexico onions. Insecticide resistance and optimizing pesticide deposition are the key factors to a reliable thrips management program.

Duttle (1994) demonstrated that thrips resistance to pyrethroids does occur in local fields, but that it is neither widespread nor stable in the population. Laboratory screening research measured up to a five-fold difference in thrips susceptibility to pyrethroids between local onion fields within the same year. Fields that exhibited higher levels of pyrethroid resistance at the season's start continued to exhibit higher levels when measured at the season's end. Onion fields with lower levels of resistance maintained lower levels throughout the season. Research measured a five-fold decrease in pyrethroid resistance the subsequent year for populations collected from the same areas.

Regional western flower thrips populations were significantly more susceptible to the active ingredient in PennCap M than onion thrips. Onion thrips were significantly more susceptible to methomyl (Lannate) than western flower thrips. No significant differences be-

tween thrips species have been measured with respect to pyrethroid efficacy in southern New Mexico populations. Generally, as a complex, regional thrips populations are most susceptible to Lannate, followed by the pyrethroids and, finally, PennCap M. Because of the potential for rapid resistance to any single insecticide, using all currently registered insecticide classes is recommended.

Although we believe climatic factors favor western flower thrips, onion field surveys have shown that onion thrips can be the dominant species. Given the potential for differences between species regarding insecticide, insecticide chemistry should be changed for fields not exhibiting adequate thrips suppression three days after application. Evaluations made after three days may not be representative of an insecticide's efficacy.

The intrinsic characteristics of currently registered insecticides also dictate their use in a thrips management program. Lannate's short residual activity (half-life of several days), particularly as temperatures increase, determine that it is best used during the cooler period of the season. Lannate is efficacious both for preventing population increases and as a rescue application. Although not as efficacious as other registered insecticides, PennCap M has been used successfully to maintain lower levels of thrips rather than as a rescue treatment to bring larger populations under control. Delaying use of pyrethroid insecticides in onion fields helps ensure reliable efficacy from this insecticide class when needed the most. On susceptible thrips populations, pyrethroids have proven to be the best for reducing high populations during the warmer periods of the season. Benefits (synergism) between Lannate and pyrethroid tank mixes have been observed in the laboratory, but they have not been consistent from one year to the next nor have they proved beneficial in field studies.

Efficacy of currently registered insecticides can be improved with application methods that increase deposition to the target area on onions (table 1). Warrior was applied at approximately 33 gpa through standard hollow cone nozzles positioned over the rows. An acceptable reduction in the thrips populations was not achieved until five days after the second application. By modifying the application method, Warrior's efficacy increased as measured by an acceptable reduction of the thrips populations three days after the first application. Application modifications included selecting nozzles that produce a much smaller droplet spectrum than the TX-12s; increasing pressure from 40 to 70 psi; and placing nozzles on drops directed at the onions' necks. Total gallons per acre was measured at 34. It is believed that a smaller droplet spectrum resulted in greater insecticide deposition to the neck regions.

Modifying application systems also may increase the availability of additional insecticide classes for use in onions. In previous research, Spintor has not been

shown to be efficacious for thrips control in New Mexico onions when applied with standard hollow cone nozzles arranged over the top. Spintor applications using higher pressure (70 psi) and through nozzles that produce a smaller diameter droplet spectrum directed at the onion neck have provided acceptable thrips control after a single application. Although not currently labeled for onions, the addition of Spintor for use in New Mexico would add an additional class of insecticides that would help manage resistance.

Given the current class of insecticides, research supports a series and not a rotational approach to insecticide selection for thrips management in southern New Mexico. Although economic damage is associated with thrips herbivory after the bulbing stage, allowing thrips populations to increase early in the season will result in reduced insecticide efficacy at bulbing and may promote insecticide resistance at a faster rate.

**Table 1. Mean number of thrips<sup>1</sup> per onion plant following ground applications of insecticides on May 29 and June 6, 2001, for small plot research studies.**

Treatment (lbs ai/A)	Nozzle position	Days after last application				
		0	3	7	5	8
Warrior (.02)	Over <sup>2</sup>	31.4	23.0	11.9	6.0	17.9
Warrior (.02)	Modified <sup>3</sup>	31.4	4.6	9.8	.8	9.4
Spintor 2SC (.1) <sup>4</sup>	Over <sup>2</sup>	39.7	30.8	20.6	13.3	47.3
Spintor 2SC (.1) <sup>4</sup>	Modified <sup>3</sup>	39.7	8.1	17.6	7.5	43.8
UTC		29.4a	31.2	24.0	37.8	70.9

<sup>1</sup>Western flower thrips is the dominant species

<sup>2</sup>Three TX-12 hollow cone nozzles positioned over each row

<sup>3</sup>Three TJ-60 8002VS nozzles. One overhead and two on drops per row.

<sup>4</sup>Not currently registered for use in onions.

**Note:** This publication reports research involving pesticides. It does not contain recommendations for their use, nor does it imply that the uses discussed here have been registered. Check for current registration of all insecticides with the appropriate state and federal agencies prior to commercial use.

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# Improving Irrigation Efficiency in Onion Production

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## INTRODUCTION

Managing the timing and amount of water applied during irrigation is a critical activity in onion production. The crop is shallow-rooted, and insufficient or excess irrigation can have a great impact on yield and bulb quality. Light, frequent irrigations are recommended, but most onion acreage in New Mexico is furrow irrigated. The least amount of water that can be applied with this system is 2 acre-inches. During certain crop development stages, such as seed germination and early crop growth, the need for frequent irrigations can lead to excessive furrow applications. This excess water can be lost to deep percolation or surface runoff. The nonbeneficial use of this excess water represents an opportunity for improving irrigation efficiency in onion production in New Mexico.

## BACKGROUND

Irrigation efficiency is the percentage of irrigation water that is put to beneficial use. Satisfying the crop's water need is the most important beneficial use of irrigation water. Irrigation efficiency (IE) can be calculated by the following equation:

$$\text{IE (\%)} = \frac{\text{Irrigation water beneficially used}}{\text{Total irrigation water applied}} \times 100$$

In addition to satisfying the crop's water need or evapotranspiration (ET) requirement, other beneficial uses of irrigation water are salt management, frost protection and soil preparation.

Nonbeneficial refers to wasteful uses of irrigation water. The principal nonbeneficial uses are deep percolation, in which the water passes below the crop's root zone; and tail water, in which the water runs off the field.

Two factors contribute to efficient irrigation. The first is applying the correct amount of water at the correct time. The goal in scheduling these applications is to match, as closely as possible, the crops ET needs. The second is applying the water uniformly across the field. Of these two factors, uniformity is the more critical in achieving high efficiency.

There is ample justification for improving irrigation efficiency. Some of the reasons are reduced water use, decreased pumping costs, less contamination of ground and surface waters by fertilizer, opportunities for increased yields, fewer drainage problems, and increased acreage that can be irrigated with a fixed water allocation.

These background concepts will now be applied to a discussion about improving irrigation efficiency in onion production.

## IRRIGATION METHODS FOR ONION

Most onions in New Mexico are grown with furrow irrigation. In areas where surface water is available and the land has been leveled, furrow irrigation is relatively inexpensive. Once ditches and delivery structures are in place, water application is convenient. However, furrow irrigation is relatively inefficient. The least amount of water that can be applied per furrow irrigation is about 2 acre-inches. During seed germination and early crop growth, the need to maintain available water near the surface requires frequent irrigation. The excess water percolates below the root zone and can contaminate groundwater with leached fertilizer.

Sprinkler irrigation permits frequent application of small amounts of water, which is ideal for seed germination and early crop growth. Sprinklers are more efficient than furrow irrigation. Sprinklers can be used to deliver water to sloping land. In some areas of the United States, sprinklers are used during seed germination and early crop growth, and furrow irrigation is used for the remainder of the growing season. Some areas also employ sprinklers for the entire cropping season, but there is some concern that wetting the foliage during late season causes foliar diseases. Sprinklers are rarely used in Dōna Ana or Luna counties, the two production centers in New Mexico.

Drip irrigation can be the most efficient irrigation method. Small amounts of water can be delivered at frequent intervals as needed by the plants. Water losses to evaporation are less than with sprinklers. Also, water is delivered directly to the root zone, so that wetting of the foliage is not a problem, as with sprinklers. In California, excellent results have been obtained with drip irrigation in onion production. Substantial improvements in bulb quality have been obtained. Much of the information presented in this paper is drawn from onion irrigation in California. Capitalization costs should be considered before a grower adopts drip irrigation.

## SCHEDULING

There are many techniques for predicting when to irrigate and how much water to apply. Some growers use a combination of techniques, but the general trend, especially for drip irrigation, is toward using evapotranspiration (ET) as the basis for scheduling. For example, a drip irrigator applies water every third day. To determine how much to apply on July 15, he can calculate the crop evapotranspiration or  $ET_c$ . This is the sum of evaporation (loss from the soil surface) and transpiration (loss from the plant leaves).  $ET_c$  estimates the volume of water lost to evaporation and transpiration during the three days between irrigations. This volume is then applied in the next irrigation. The water volume is determined by the formula  $ET_c = K \times ET_o$ , where K is a crop coefficient and  $ET_o$  is a reference ET. The values for these two latter figures can be obtained from the New Mexico Climate Center Web site (weather@nmsu.edu). Assume a crop coefficient of 1.0 inch/day and reference ET of 0.25 inches/day for July 13, 14 and 15.  $ET_c = 1.0 \times 0.25 \times 3 \text{ days} = 0.75 \text{ inches}$ . Drip irrigation systems generally operate at 90 percent efficiency. So 0.75 inches is divided by 0.90 to obtain a final volume of 0.83 inches. This figure can be converted to gallons per acre by multiplying 0.83 inches by 27,154 gallons per acre-inch. The answer, thus, to the question of how much water to apply on July 15 is 22,628 gallons per acre.

## UNIFORMITY

The more evenly water is applied over a field, the more efficient the irrigation can be. If every part of the field were to receive the same amount of water, uniformity would be 100 percent. But as a practical matter, no irrigation system can achieve 100 percent uniformity. Some parts of the field always receive more water than others. Of the three methods used for onions, furrow irrigation is the least likely to be uniform. For example, consider a furrow application with poor uniformity. To ensure adequate irrigation in all areas, some portions of the field will be overirrigated. This overirrigation causes nonbeneficial uses—deep percolation and surface runoff. Sprinkler systems are more uniform than furrow irrigation, but wind and slope can cause excessive irrigation in some areas. A well-designed, well-maintained drip system can apply water more evenly.

## SUMMARY

Irrigation efficiency in onion production can be improved by scheduling water applications to match, as closely as possible, the evapotranspiration needs of the crop; designing irrigation systems for maximum uniformity; and embracing a maintenance plan that ensures continued high uniformity.

Adopting drip irrigation, which has the potential for high uniformity, is an important step toward greater efficiency. Drip systems tend to be highly efficient because they minimize or eliminate surface runoff, reduce deep percolation and eliminate the need to overirrigate some parts of the field to compensate for underirrigation in other parts.

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# Contributions of the NMSU Breeding Program to the New Mexico Onion Industry

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First, I will make some general comments about the New Mexico onion industry. These comments are based, in part, on available statistics and, in part, on observation. I will discuss some of the changes that have occurred during the past 30 years and some possible explanations for these changes. I will outline some of the contributions that the NMSU onion breeding program has made to the industry and how these contributions have impacted the industry.

Onion acreage in New Mexico has grown from about 3,000 acres in 1970 to between 7,000 and 10,000 acres during the last 10 years. Along with the growth in acreage, there has been an increase in per-acre average yield from nearly 600 to approximately 900 50 lb. bags. With more than a doubling of acreage and a 50-percent increase in per-acre yield, New Mexico growers market significantly more volume than in the past. New Mexico now produces approximately half of the U.S. supply of onions during June and July. The number of growers producing more than 100 acres has increased, and there has been an increase in the number of shippers and brokers.

The industry has matured in different respects, and options for marketing have become more numerous. Many of the present producers are second and third generation onion growers, so that the level of experience in the onion industry is much greater than in the past. In addition, the industry has tended to integrate vertically. That is, several growers harvest, grade and pack their own onions, capturing a significant fraction of the marketing income that in the past would accrue to shippers and brokers. Marketing of "sweet" onions has become an option, and several growers and shippers promote and sell a fraction of their crop under a "sweet" label. The proportion of the crop that is sold to processors has increased to the extent that processing onions

have become an important marketing option for New Mexico onion growers.

New Mexico has several advantages for producing and marketing onions and some disadvantages in comparison with competing production areas. The climate permits production of short-, intermediate- and long-day varieties, with a harvest season extending from late May through late August. The long harvest season permits use of equipment and facilities over a long period of time, which reduces the unit cost assigned to those items. For example, a grader used for 12 weeks as compared with only four weeks results in less fixed cost assigned to each sack of onions. Our desert climate, in general, is favorable for onions, although summer rainfall sometimes causes problems. The high elevation, and resulting high light intensity, plus a high proportion of sunny days are conducive to a very high yield potential. The history of onion production in the area has resulted in knowledgeable growers and the presence of handling and marketing structures and personnel.

Disadvantages include high temperatures that sometimes cause heat damage to the bulbs, and the summer rainfall that sometimes causes problems with decay. During particularly wet seasons, the bacterial diseases can be highly destructive. Isolation, resulting in less than ideal transportation availability and higher transportation costs, has been a disadvantage at times. However, overall, the advantages outweigh the disadvantages at times. No doubt this is the main reason that the New Mexico industry is expanding.

The NMSU breeding program began in 1976 with a modest plan to develop bolting resistance in a short-day (overwintering) variety, so that onions could be planted in September instead of mid-October. The earlier planting results in larger bulbs and greater yields and less chance of cold damage to the overwintering plants.

'NuMex BR1' was released in 1980 and was accepted immediately by the industry. The earlier planting gave it a major yield advantage over other available varieties. A major contribution of the NMSU program was the recognition that bolting resistance is a major advantage for the overwintering crop. 'NuMex Sunlite' was released in 1986. During the next few years, it largely replaced 'NuMex BR 1'. 'NuMex Sunlite' has since been replaced by 'NuMex Starlite' released in 1990, 'NuMex Mesa' released in 1996, 'NuMex Chaco' released in 1999, and hybrids developed by the seed industry. 'NuMex Mesa' has improved bolting resistance over 'NuMex Sunlite'. It also is much firmer and has better scale retention. 'NuMex Chaco' is the first short-day variety from the NMSU program that has a high percentage of single centers suitable for ring processing. 'NuMex Mesa' and 'NuMex Chaco' should serve the New Mexico industry well for several years to come. Chris Cramer will have more to say about 'NuMex Chaco' in his presentation.

One of our goals was to develop later-maturing varieties of overwintering onions, which could be planted in the fall to mature from June 10 to July 1. In 1986, we released 'NuMex Sundial' and 'NuMex Suntop', for planting in mid-October and harvest July 1. Later, in 1996, 'NuMex Vado' and 'NuMex Luna', which mature from planting on June 10 and June 20, respectively, were released. The varieties have been partially successful. Producers still grow 'NuMex Sundial', and they have begun to plant 'NuMex Luna'. One concern with these late varieties that have longer growing periods is that they produce several more leaves and, as a result, tend to have large necks. Because of this, they tend to be more susceptible to bacterial diseases if fields are wet at harvest. However, the yield potential is excellent, and the production cost likely is less than for transplants that would mature in the same season. Time will tell whether these varieties will be competitive with transplants.

'NuMex Starlite' was the first variety released from NMSU that was recommended for marketing as a "sweet" onion. Marisa Wall has since released four other "sweet" varieties: 'NuMex Sweetpak', 'NuMex Dulce', 'NuMex Freedom', and 'NuMex Arthur'. These varieties provide the New Mexico industry with five high-quality, low-pungency options that mature from late May through mid-July and form the basis for a national sweet onion promotional program.

The varieties grown in New Mexico before 1980 were, in general, highly susceptible to pink root disease. By that time, much of the land devoted to onion production had been highly infested with the pink root pathogen. Pink root started to have a major effect on yields. Growers asked that the NMSU breed-

ing program have a primary objective to develop pink root resistant (prr) varieties in all maturity groups. Actually, this had already begun with the development of 'NuMex BR 1' from 'Texas Grano 502', a variety that had partial resistance to pink root. 'NuMex Sunlite' had improved prr over 'NuMex BR1', and subsequent releases have high prr levels. The NMSU program has had an important impact on New Mexico onion yields through improvement in pink root resistance. Many varieties developed by the seed industry since 1980 also are partially or highly resistant to pink root. Some of these varieties were developed using germplasm released by the NMSU program.

In 1980, the NMSU program was expanded to include spring-planted, intermediate- and long-day onions. The primary objective was improved pink root resistance. 'NuMex Casper' was released in 1990. 'NuMex Casper,' an intermediate white variety, matures on July 10 from spring seeding or June 25 from transplants. 'NuMex Bolo' and 'NuMex Jose Fernandez' were released in 1992. These are yellow intermediates that mature about July 10. Jose Fernandez generally has been well-accepted. It competes well with intermediate-day hybrids. 'NuMex Centric', a yellow variety with a high percentage of single centers, was released in 1996. It matures from July 20 to 25 from spring seeding. 'NuMex Centric' has marketing potential as a ring processing onion but has not yet been grown extensively. Several excellent intermediate- and long-day varieties with high prr levels have been developed by the seed industry since 1980. Many of these are grown extensively in New Mexico.

The NMSU program has concentrated on yellow varieties, because most of the shipped volume is yellow. However, much is shipped as mixed loads, containing yellow, white and red varieties. There is a need for more work on both white and red varieties that are adapted for production in New Mexico. One way to spread risk is to produce all three colors that mature throughout the harvest season. With a harvest season of 12 weeks and all three colors maturing each week, a grower conceivably could plant 36 different varieties.

Our program has concentrated on developing open-pollinated varieties. There seems little advantage of a hybrid variety over an open-pollinated one. Except, seed companies cannot easily protect open-pollinated varieties. And, as a result, the major companies tend to market only hybrids. Seeds of the NMSU varieties have mainly been produced locally. Local producers have problems dealing with the number of varieties released. Also, because sales are mainly local and varieties are somewhat in flux, inventory management becomes a major concern.

We initiated a program to develop inbreds for hybrids about 1985. Several inbreds are nearing release, and I think that Chris Cramer will talk more about those in his presentation. The minimum time to develop an inbred is about 15 to 18 years. But once developed, a high-quality inbred can sometimes be used to produce several different varieties.

Marissa Wall did an excellent job on the sweet onion program. The varieties that she released are likely the best quality of any sweet varieties available, and they will be an excellent resource for the New Mexico industry as it moves more strongly into a sweet onion marketing program. Since my retirement in 1996, Chris Cramer has managed the program. He has done an excellent job and has finished out some of the lines that were partially complete when I retired. He will describe more recent developments in the program.

I am still working in the program part-time to maintain the genetic quality of varieties that have been released. For each variety, we screen a planting every two years to select 100 or more bulbs that are then planted for seed increase. This small quantity is further increased (seed to seed) to provide about 10 pounds (more or less) to the New Mexico Crop Improvement Association as foundation seed. This seed should then be the sole source of foundation seed for seed growers to increase to either registered or certified seed. Most of the varieties released since 1990 are required to be sold only as certified seed. By insisting that seeds be certified, growers can take advantage of the program to maintain as high a genetic quality as possible. I highly recommend that when you purchase seed of any NMSU variety you insist it carry a certification tag.

My current program to maintain the varieties is supported by the Jose Fernandez Chair in Crop Production. This chair was created by a grant from the Chavez family in honor of Mrs. Chavez's father, Jose Fernandez, who was a prominent farmer and grew numerous crops in southern New Mexico for many years. I wish to express my thanks and appreciation to the Chavez family for the support they have provided to the program over the past 10-plus years.

I would be remiss if I did not say "thank you" to the New Mexico onion industry for support provided through the New Mexico Dry Onion Commission for the onion breeding program. Your support has been excellent and has enabled much of the work to date. This support continues to be strong.

# Current and Future Objectives of NMSU's Onion Breeding Program

**Christopher S. Cramer, Assistant Professor, Onion Breeder, New Mexico State University**

When I first joined the NMSU onion breeding program in 1997, 17 onion varieties already had been developed and released and firm objectives for variety development had been set. Many of the breeding objectives remain the same today. In my talk, I will discuss the current objectives of the NMSU onion breeding program, present several new varieties that have been released over the past three years and discuss the program's future objectives.

As Joe Corgan discussed, one of the program's breeding objectives was to develop varieties with varying maturities to provide continual onion harvest throughout the season. Currently, there are few fall-seeded cultivars that mature in late June. Fall-seeded varieties that matured at the same time as transplanted varieties would be more economical than transplanted varieties and would provide higher yields, comparable bulb quality and continual harvest. In addition, white and red onion varieties need to be developed with varying maturities to support gaps in harvest periods. With these needs, our breeding program will continue to develop varieties that fill a certain harvest period.

Another objective is the ongoing development of pink root resistant varieties. Pink root is a major soil-borne fungal disease found in New Mexico. The disease reduces bulb size, which, in turn, reduces bulb yield. Resistant varieties are less expensive than other control measures, such as fumigation. Previously released NuMex onion varieties have possessed a high level of pink root resistance. All future varieties released from the program will have a high level of pink root tolerance or resistance.

For fall-seeded onion varieties, bolting or premature seedstalk formation can be a problem, depending on environmental conditions. Growers will plant bolting-

susceptible varieties later to reduce bolting incidence. Onions planted later are more susceptible to winter injury, particular in the Uvas region and near Deming. Varieties that can be planted earlier with no increase in bolting will exhibit less winter injury and bolting and may produce larger bulbs and greater yields than bolting-susceptible varieties. An ongoing objective of the breeding program is to develop fall-seeded varieties that possess a high level of bolting resistance and varieties that can be planted earlier than bolting-susceptible varieties with no increase in bolting.

Since the program first released onion varieties, there has been interest in low pungency varieties that could be marketed as sweet onions. Sweet onions often will command a higher price in the marketplace and represent a higher return. A sweet onion breeding program was initiated by Marisa Wall to develop varieties that were uniformly low in pungency and varied in maturity times, so that New Mexico sweet onions could be marketed over a longer time period. To date, five varieties have been developed and released that can be marketed as sweet onions. Our objective is to continue Wall's work by developing low pungency varieties to fill certain harvest gaps and also extend the harvest period for sweet onions in New Mexico.

With the volatility of the fresh-market onion industry, more growers and shippers are looking to the processed onion industry for increased sales. Among the different types of onion processing, ring processing can provide a high return. For ring processing, the percentage of onions that possess a single growing point or single center is critically important. Onion ring processors prefer shipments with 85 percent or higher single centers. Breeding for high percentages of single-centered onions is fairly new. As a result, fall-seeded

onion varieties normally possess a low to moderate percentage of single-centered bulbs. The continued goal of our breeding program is to develop onion varieties that produce a high percentage of bulbs with single centers, such that the varieties will be well-suited for ring processing.

Six varieties that have been developed and released from the onion breeding program in the last three years illustrate the program's current objectives. In 2000, the program released 'NuMex Arthur', 'NuMex Chaco', 'NuMex Freedom' and 'NuMex Snowball'. 'NuMex Chaco' is an open-pollinated, short-day, fall-seeded, yellow, grano-type onion that matures from May 20 to May 30. It has excellent yield, firmness, pink root resistance and bolting resistance; a high percentage of single-centered bulbs; round to slightly top shape; good scale quality; and early maturity, similar to 'NuMex Mesa'. 'NuMex Chaco' produces a higher percentage of single-centered bulbs than any other cultivar in its maturity class. 'NuMex Snowball' is an open-pollinated, spring-seeded, late-maturing, intermediate-day, white onion that matures from July 25 to August 5. 'NuMex Snowball' has a round shape, excellent yield, white bulb color, firmness, pink root resistance, large bulbs and a moderate percentage of single-centered bulbs. Both varieties are being marketed exclusively through Lockhart Seeds of Stockton, Calif. The first commercial seed for sale is expected this fall.

Both 'NuMex Arthur' and 'NuMex Freedom' were developed by Wall's breeding program. These varieties produce low pungency bulbs that can be marketed as sweet onions. 'NuMex Freedom' is an open-pollinated, fall-seeded, late-maturing, intermediate-day, yellow, grano-type onion that matures from June 25 to July 1. It has excellent yield, pink root resistance and bolting resistance. 'NuMex Freedom' is the only low pungency onion in its maturity class that can be fall-seeded to produce high yields of "sweet" onions for marketing from late June to early July. 'NuMex Arthur' is an open-pollinated, spring-seeded, late-maturing, intermediate-day, yellow onion variety that matures from July 23 to Aug 1. It has excellent yield, pink root resistance and late maturity. Bulbs are very mild, firm, large and nearly round. 'NuMex Arthur' is the only low pungency onion variety in its maturity class to provide a harvest of low pungency ("sweet") onions during late July. Seed of both varieties is being produced locally, and the first commercial seed will be available for sale this fall from Lockhart Seeds or Helena Chemical Co.

This year, we announced the release of two new fall-seeded onion varieties. 'NuMex Crimson' is an open-pollinated, short-day, early-maturing, red onion variety that matures about the same time as 'Cardinal' from late May to early June. The variety has slightly better pink root resistance, less Fusarium basal rot, a higher percentage of single centers and higher yields than 'Cardi-

nal' on pink-root infested soils. 'NuMex Crimson' has excellent internal and external red scale color, excellent bolting resistance and a flat globe shape. 'NuMex Solano' is an open-pollinated, intermediate-day, late-maturing, white onion variety that matures from June 13 to June 21. It has excellent clean, white bulb color; excellent bolting and pink root resistance; round and hard bulbs; and a high percentage of single-centered bulbs. 'NuMex Solano' matures later than any other fall-seeded, white onion variety and matures at a time when transplants would be harvested. Both varieties have performed well in our fields as well as growers' fields. Commercial seed of both varieties should be available in fall 2004.

We will continue to use fall-seeded transplants and spring-seeded variety trials to compare new varieties and advanced breeding lines to released NuMex varieties and other commercially available varieties for bulb yield and quality characteristics. Trial results will be available to growers, shippers, packers, salespeople and breeders at our annual field days in variety trial reports, and on our onion Web page on the World Wide Web at <http://onion.nmsu.edu>.

The future objectives of our breeding program are multifaceted. The objectives come from changes we think will happen in the onion industry. We want New Mexico onion growers to remain competitive. These objectives will not only impact our breeding goals but also our research goals.

The current method of hand harvesting is labor-intensive and accounts for two-thirds of the cost of producing a sack of onions. Mechanical harvesting would greatly reduce harvesting costs by reducing labor costs and would provide growers with more money. Other onion growing regions of the United States are using mechanical harvesting successfully. In order to remain competitive, New Mexico growers will adopt mechanical harvesting. However, appropriate cultural practices and onion varieties must be developed before mechanical harvesting can become a profitable and feasible reality in New Mexico. The current varieties grown in New Mexico were developed for hand harvesting and not for mechanical harvesting. Mechanical harvesting of current varieties can result in damage; quality reduction; yield reduction; and additional harvesting, grading and processing costs. New onion varieties that are adapted to mechanical harvesting must be developed to prevent reduced onion yield, quality and profit. In growing regions where mechanical harvesting is used, onion cultural practices have been modified to better accommodate mechanical harvesting. Research needs to be conducted to determine the cultural practices, such as irrigation, fertilization and harvest timing, which need to be modified for efficient and profitable mechanical harvesting.

As with other crops, special onion commodities command a higher price and provide growers with addi-

tional income. The price that growers in Georgia receive for Vidalia sweet onions, an onion specialty crop, is three times the amount that New Mexico growers receive for yellow onions. Consumers are increasingly asking for and being provided with vegetable varieties that possess high nutritional quality, such as tomatoes with higher lycopene levels and carrots with higher beta-carotene levels. These vegetable varieties with increased nutritional content command a higher price than traditional varieties and also increase the marketing options for growers. Onions naturally possess high levels of a special nutritional compound called quercetin. When onions are consumed, quercetin is released into the blood stream, and it acts as an antioxidant molecule by binding free radicals and preventing cancer cells from developing. Onion varieties that possess very high quercetin levels could be marketed as cancer preventative foods. An onion variety with increased quercetin levels has not been developed yet. Developing such a variety will provide New Mexico onion growers and shippers with increased onion sales to a different market segment and increased price returns.

Among the fungal diseases that affect onion, Fusarium basal rot (FBR) ranks as the second most devastating disease in New Mexico, with FBR incidence likely to increase in the future. Levels of resistance in short- and intermediate-day commercial varieties are low. Our program is screening NMSU's current breeding lines and commercial short- and intermediate-day varieties for FBR resistance. The results from this screening will help identify sources of FBR resistance that can be incorporated into NMSU varieties, develop efficient selection strategies for improving FBR resistance, and develop FBR-resistant, short- and intermediate-day varieties.

For the last 10-15 years, hybrid onion varieties have been the standard from commercial seed companies. Our breeding program has been working on the development of pollinator, male-sterile and maintainer inbred lines that can be used to develop hybrid varieties. We are in the process of evaluating hybrid varieties developed from our program. In the near future, we expect to release hybrid varieties that will perform as well as, if not better than, open-pollinated varieties released from the program.

At this time, I would like to thank all of the individuals who are involved with the onion breeding program and help to make it a success. A majority of the program's funding comes from the New Mexico Dry Onion Commission and the New Mexico onion growers. Without your financial support, none of the program's work would be possible. I would like to thank Jim Fowler and his support staff at the Fabian Garcia Research Center for their assistance with our field work. I would like to thank Ray Muhyi, our new

senior research specialist for the program, for all of his help. I would like to thank the graduate students who are involved in the program, Troy Larsen, Jessica Lopez and Jose Palma. They are responsible for some of the research that the program conducts. I would like to thank all of the undergraduate students who work on the program. Each year, we hire 12-15 students to work with us. The work they do is not glamorous but is necessary if the program is going to be successful. Finally, I would like to thank Joe Corgan for all of his advice and for being a valuable mentor to me.

# The Role of Sweet and Processing Onions in the Future of the New Mexico Onion Industry

Joe Corgan, Professor Emeritus, New Mexico State University

My comments about sweet onions have to be prefaced by my background, which is in research on plant breeding and genetics, rather than onion production and marketing. I actually feel comfortable talking about production but am a rank amateur when it comes to promotion and marketing.

First, the New Mexico industry has a great set of varieties to work with in developing a sweet onion promotion program. With 'NuMex Starlite' and Marisa Wall's four other releases, sweet onion marketing can begin about May 20 with 'NuMex Sweetpak' and continue uninterrupted until about July 30. 'NuMex Arthur' matures in mid-July in Las Cruces, but in the Uvas and Deming area it should mature a week or two later. By planting later (March 15), it may be possible to delay maturity until August 1 or later. With an August 1 maturity, by the time harvest, grading and marketing are complete, we may have extended the marketing season to mid-August. There also is the option to store the late onions in cold storage for the short term or in controlled atmosphere for the longer term. It seems to me that the longer the marketing season can be extended, the more effective it can be.

Sweet onion quality will be important to success of a promotion and marketing program. New Mexico's sweet onions are high in quality in that pungency is low and sugar content is high. Not much emphasis has been placed on actual sweetness in sweet onion marketing. However, with the high light intensity in New Mexico, resulting in high rates of photosynthesis, our onions probably are the sweetest available anywhere. Over the years, I have purchased "sweet" onions marketed from other areas of the United States and South America and compared them with New Mexico's sweets. None are as good as the New Mexico ones. This may be a biased

opinion, but I think actual sweetness is a promotable characteristic.

Maintaining quality will be a continuing issue in a sweet onion marketing program. How do you arrive at standards, and once you define them, how do you enforce them? If you really want an effective statewide promotion and marketing program, then enforcement of standards becomes a major issue. One person marketing a pungent onion under a "sweet" label can impact the entire state program. A national promotional program is not cheap. At its best, it would likely require professional management and the cost would be in the hundreds of thousands, if not millions, of dollars. Assuming the promotional costs were \$1 million annually, that's about 2 percent of the gross value of onions marketed from the state. Can a sweet onion program recoup this cost and, if so, is there adequate interest and support for it among New Mexico growers and shippers? A vehicle for funding such a program is available through the New Mexico Dry Onion Commission, but grower assessments would have to be significantly higher than at present.

In summary, the high-quality, sweet varieties are a resource available to the New Mexico onion industry. I have questions about how you capitalize on this resource, but I don't have the answers.

In terms of processing onions, I would say that in maintaining the varieties already released by the NMSU program, we continue to cut bulbs and screen for single centers. Several varieties released to date have sufficiently high single center percentages to qualify for ring processing.

# What's Hot, What's Not and What's Next: Onion Trends and Promotional Projects

Tanya Fell, Director of Public and Industry Relations, National Onion Association

There are current trends in American society that promise to have great impact on onion production and marketing. The most significant is the portion of the food dollar that is spent away from home. Currently, more than 44 percent of the U.S. food dollar is being spent away from home, and it is anticipated that it will exceed 60 percent by 2010. This represents a shift in the balance of power from kitchens to restaurants. It is thought that this shift will result in increased onion consumption in the United States.

Another favorable trend for the onion industry is increasing consumer demand for spices and herbs. Americans are expecting more onions, chile pepper, cilantro and garlic in their diets.

A third, and fundamentally important, trend is a shift away from healthful foods and toward indulgent diet choices. The number of Americans who avoid fats and fried foods is decreasing. The numbers are increasing for those who eat doughnuts, steaks, deluxe hamburgers and creamy ice creams.

Another general consumer trend is toward foods that are convenient, wholesome, good tasting and economical.

## PROMOTIONAL PROJECTS

Promotional efforts this past year by the National Onion Association generated outstanding results. The ultimate goal of all public relations efforts is to get the largest impact for the least amount of money. The following accomplishments have been made possible due to the invaluable support of growers, shippers and suppliers from across the nation.

In looking at food service, consumer, produce and onion trends, it is apparent that the onion industry still has growth potential. On the consumer watch, one of the trends in meal preparation is more spices and herbs. Consumers want to be indulged with lots of flavor without feeling deprived; meaning onions are being used more and more in a wide range of cuisines.

One trend that is particularly interesting came from the Perishables Group Fresh Facts study, which stated that 31 percent of consumers would like more recipes for onions. This figure was the highest in the survey of all fruits and vegetables. Additionally, 16 percent of consumers were seeking more information about preparation.

In the way of promotions for the year of 2001, the National Onion Association (NOA) cosponsored the spring series of *Taste of Home* cooking schools. More than 130 cooking schools were held nationwide with a total attendance exceeding 120,000. Participants who attended the schools are people who generally prepare a number of meals at home each week. Onions were featured in the cooking demonstrations with a focus on key onion points during each presentation. Fourteen NOA recipes and eight photos were included in the *Taste of Home* cookbook. The NOA's "Favorite Onion Recipe" brochure was supplied for each participant gift bag. This is one of the larger projects that the NOA has attempted, and we are excited that it was such a huge hit across the country.

New black and white mat releases are also currently being made available to the media. Essentially, a black and white mat release is a camera-ready article available to the editors of more than 10,000 community newspapers nationwide. The spring article, "Onions



Sizzle with Flavor and Nutrition,” focused on the health benefits of onions and included a sizzling steak and onion fajita recipe. Based on the latest circulation report, the article has generated nearly 1,000 newspaper articles with a readership of more than 73 million. The fall release, “Warm Up With Savory Onion Soup,” discusses handling, storing and preparing the storage onion and includes an onion soup recipe. This release currently has received almost 1,000 placements with a readership of more than 56 million. If the NOA were to pay for the newspaper placements individually, the cost would have exceeded \$303,000. The numbers are still climbing at this time, so be sure to watch your local newspapers for this article.

Following the Alliums 2000 Conference in Athens, Ga., the NOA developed new onion health fact sheets and completed the “Phytochemical Properties of Onions” health summary. Both pieces and the newly developed “Onions for Your Health” brochure were sent to more than 700 national health and food syndicated writers, magazine writers and radio food shows. This mailing produced significant interest from the media, which, in turn, produced a number of articles that featured the health aspects of onions. Articles appeared in *Better Homes and Gardens*, *Ladies Home Journal* and *Bon Appétit*.

Foodservice publicity has also been a key to promoting onion usage to chefs, restaurant operators and commercial operators. The NOA received 21 placements in a variety of publications with an estimated value of nearly \$75,000. The placements consist of chef-developed recipes and food photography. The NOA works directly with chefs for recipes and new onion trends and uses. I would like to encourage everyone to share their favorite restaurant use of onions by simply e-mailing me at [tfell@onions-usa.org](mailto:tfell@onions-usa.org).

Promotional efforts are a key to helping market onions and increase the per capita consumption of this wonderful vegetable. The promotion committee would like to thank everyone involved for their continued support of promotions and generosity this past year.

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# Good Agricultural Practices (GAP)

Nancy C. Flores, Food Technology Specialist, New Mexico State University

Food safety begins on the farm for fresh fruits and vegetables. Good Agricultural Practices or GAP is a program to improve food safety. GAP is important because the U.S. total per capita annual consumption of fruits and vegetables is increasing. Over the last 27 years, there has been a 24-percent increase. With this increase has come greater consumer concern about foodborne illness related to fresh fruit and vegetables. There is reason for the concern—75 percent of foodborne illness outbreaks have been related to domestically grown produce. Most of the outbreaks were caused by salmonella and *E. coli*. Changes in the social demographics of our country also make GAP important. The elderly, immune compromised, pregnant women, and children are more vulnerable to foodborne illness than healthy people.

There are several things that can be done to reduce the risk of foodborne illness from fruits and vegetables:

- Microbial contamination can occur at any point from farm to fork.
- Commitment from farm owners and workers to grow and harvest the safest produce possible.
- Following Good Agricultural Practices (GAPs) on the farm and Good Manufacturing Practices (GMPs) the packing house will reduce the risk of microbial contamination.
- There is no guarantee that produce is free of harmful bacteria.
- Taking preventative measures during all production stages may reduce the risk of contamination and spread of harmful bacteria.

There is a national initiative to provide training to farm owners and farm workers on:

- Identifying potential sources of microbial contamination.
- Hand washing and personal hygiene.
- Minimizing risk during planting and production.
- Minimizing risk during harvest.
- Minimizing risk during postharvest handling.

## FURTHER INFORMATION

Cornell Good Agricultural Practices Program,  
Cornell University, Geneva, N.Y. 14456; telephone:  
315/787-2625; e-mail: eab38@cornell.edu.

# Exporting New Mexico's Onions to Mexico and Other Countries

**Sherry Sanderson, Bureau Chief, Entomology and Nursery Industries,  
New Mexico Department of Agriculture**

In 2000, approximately 8,000 acres of onion were planted in New Mexico. The production centers were Doña Ana, Luna and Sierra counties.

Onions were exported to three foreign countries in 2001: Mexico, Honduras and Nicaragua.

Each export shipment requires a federal phytosanitary certificate. NMDA issued certificates for the shipment of 43,664,000 lbs to Mexico, 270,000 lbs to Honduras and 135,000 lbs to Nicaragua.

For export to Mexico, the federal phytosanitary certificate requires additional declarations for stem and bulb nematode (*Ditylenchus dispaci*), onion white rot (*Sclerotium cepivorum*) and silver leaf whitefly (*Bemisia argentifolii*). No additional declarations are required for export to Honduras or Nicaragua.

Garlic is a new crop for New Mexico, but farmers have to be vigilant when they import garlic planting material so as to not accidentally introduce garlic rust, which could attack the onion crop.

Farmers should also be vigilant about two new insect pests—leek moth and a new thrips species—which need to be excluded from the state.

To expand the export of onions to foreign countries, New Mexico must first take steps to protect its production. This can be done by conducting additional pest surveys in the production areas, imposing more quarantines and inspecting imported propagation material.

Farmers should alert NMDA in advance when they are considering exporting to foreign countries. This gives NMDA staff time to prepare the federal phytosanitary certificates.

# A Marketing Order: How it Works

Thomas Clevenger, Professor Emeritus, New Mexico State University

A federal crop marketing order is an organizational marketing alternative that agricultural producers of specialty crops may want to consider. This order is not permitted for livestock or the basic field crops. A marketing order is a way for an agricultural crop industry to seek orderly marketing of its production.

A federal marketing order sets up a mechanism for all producers of a crop in a given area to exercise control over selected aspects of marketing their crop and yet be exempt from antitrust prosecution. The federal law permitting marketing orders is the Agricultural Marketing Agreement Act of 1937.

Each crop marketing order is developed by and for the particular needs of the commodity group seeking the marketing order. One or all of the following provisions may be included in a crop marketing order:

- specifying grades, size, quality or maturity;
- advertising, promotion, market development and research;
- allotting the amount each processor may handle or purchase;
- establishing how much may be marketed during a set period;
- establishing methods of determining surpluses and their control and disposition;
- establishing a reserve product pool;
- inspecting the product;
- fixing the size, capacity, weight, dimensions or pack of the containers used in marketing;
- prohibiting unfair competition and unfair trade practices; and
- requiring processors to file their selling prices and to not sell below prices filed.

Only those marketing tools included in a marketing order may be used by that commodity group. Any one

tool, or a combination of the above, may be written into the order.

To start a marketing order, an order proposal must be submitted with a request for hearings on the order to the U.S. Secretary of Agriculture. If sufficient grower support is shown, the secretary holds public hearings on the proposal. Opportunities for written comments follow the hearings. Then the secretary makes a decision about whether or not to submit a proposed marketing order to a vote of all growers. The marketing order is started if two-thirds of the voting growers vote in favor of the order or if those representing two-thirds of the production vote for the order. Marketing orders are ended when more than half of the growers with more than half the production vote against the order. An order may be amended through a procedure similar to that for initiating the order.

A marketing order is administered by an elected board of growers and processors and a public member who is elected by the other board members. Board members, other than the public member, are elected by those they represent on a one-person-one-vote basis. The U.S. Secretary of Agriculture oversees board actions to make sure the board does not act beyond its authority as given in the marketing order.

Under the order, it is the processors who are regulated. Assessments for operating the order are collected from processors or first handlers. However, they can pass that cost forward to buyers or deduct it in making their purchases from growers. Imports are not regulated under a marketing order.

Advantages of a marketing order include industry self-control through use of selected marketing tools. It provides a means for all growers and processors to join together for various marketing activities. A disadvantage is that it is compulsory for all in the defined area.

# SUMMARY

**Robert F. Bevacqua, Extension Vegetable Specialist, New Mexico State University**

Onions are an important agricultural commodity in New Mexico. The desert climate, high elevation and high light intensity are conducive to high yields. Since 1976, the industry has been supported by a breeding program at NMSU that has developed 28 open-pollinated, mostly yellow varieties of the grano-type. The current objectives of this breeding program are to develop varieties that are resistant to pink root disease and bolting, have single centers, possess high nutritional qualities, are suitable for mechanical harvesting and allow for continual harvest through the summer.

Thrips are the most common insect pest of onion in New Mexico. An integrated pest management (IPM) approach is recommended for their control. Insecticide sprays are an important part of this IPM approach.

Onions are a shallow-rooted crop and are usually furrow irrigated. These factors can contribute to wasteful water use. Irrigation efficiency can be improved by adopting drip irrigation.

There are current trends in American society that promise to increase the demand for New Mexico's onions. These trends include more meals being eaten in restaurants, more interest in meals flavored by herbs and spices, and less interest in healthful foods.

Onion consumption is being promoted by industry associations that sponsor cooking schools, distribute recipes and prepare fact sheets on onions' health benefits.

Some opportunities exist to expand New Mexico's onion industry. Following the success of the Vidalia onion in Georgia, sweet onions could be marketed as low in pungency and high in sugars. The production of varieties with single centers for onion ring processing could be increased. More onions could be exported to Mexico and Central America. Also, more specialty onions could be developed. For example, those that are

high in antioxidants could be marketed as cancer preventing foods.

Consumer concern about foodborne illnesses has led to a new program called Good Agricultural Practices or GAP. The aim of this program is to improve the safety of fresh fruits and vegetables.

The New Mexico industry is considering adopting a marketing order to bring greater stability to onion marketing. If two-thirds of the growers are in favor, then the federal government steps in with a program to make marketing more orderly. The program can include grading, packaging, inspections, allotments or limits and promotion.

New Mexico State University is an affirmative action/equal opportunity employer and educator. NMSU and the U.S. Department of Agriculture cooperating.

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