

MANAGING CARZOL® FOR MAXIMUM EFFICACY AGAINST THRIPS

Lynn Jensen
Malheur County Extension Service
Clinton Shock and Lamont Saunders
Malheur Experiment Station
Oregon State University
Ontario, OR, 2006

Objective

Determine the most effective combinations of insecticides to use with Carzol® to provide season-long thrips control in onions and reduce the risk of resistance development.

Introduction

Oregon State University (OSU) trials in 2005 showed that Carzol (formetanate hydrochloride) was effective in controlling thrips and reducing iris yellow spot virus (IYSV) incidence. The U.S. Environmental Protection Agency (EPA) granted several states a Section 18 emergency registration for Carzol use on onions for the 2006 production year, but at a lower rate than was considered effective.

Materials and Methods

Two trials were established at the OSU Malheur Experiment Station using standard production practices, one to look at the effectiveness of Carzol applied at different rates and spray intervals, and the other trial tested the most effective insecticides to rotate with Carzol in a complete thrips control program. The Carzol spray interval trial consisted of Carzol rates of 8, 12, 16, and 20 oz/acre, with application intervals of 1, 2, 3, and 4 weeks. All Carzol, MSR®, Lannate®, and Penncap-M® applications were buffered to pH 6.0 and a silicon adjuvant added to all insecticide treatments. The Carzol rotation trial consisted of 16 treatments of Carzol rotated with other insecticides (Table 1).

Insecticide applications were made using a CO₂-pressurized backpack sprayer with water volume set at 38 gal/acre. Each treatment was replicated four times. Insecticide treatments were made on a weekly basis during June and July. Thrips counts were made weekly by visually counting the total number of thrips on 15 plants. Iris yellow spot virus severity was evaluated in August. Yield and grade information was completed in late September. The onion variety was 'Vaquero' (Nunhems, Parma, ID) and the seeding rate was 134,000 seeds/acre.

Table 1. Insecticide treatment rotated with Carzol to increase the effectiveness of a season-long program, Malheur Experiment Station, Oregon State University, Ontario, OR, 2006.

	Week 1	Week 2	Week 3	Week 4	Week 5	Week 6	Week 7	Week 8
A	Warrior+ MSR	Warrior+ Lannate	Warrior+ Lannate	Warrior+ Lannate	Warrior+ Lannate	Warrior+ Lannate	Warrior+ Lannate	Warrior+ Lannate
B	Skip	Skip	Skip	Carzol 20 oz	Skip	Skip	Carzol + Lannate	Skip
C	Warrior	Warrior+ MSR	Lannate	Success+ AzaDirect	Carzol 20 oz	MSR+ Diazinon	Skip	Skip
D	Success+ AzaDirect	Success+ AzaDirect	Carzol 12 oz	Skip	Skip	Carzol 12 oz	Skip	Skip
E	Warrior	Warrior	Carzol 12 oz	Warrior+ Lannate	Carzol 12 oz	Warrior+ Lannate	Skip	Skip
F	Warrior	MSR+ Pennicap	Carzol 12 oz	MSR+ AzaDirect	Carzol 12 oz	MSR+ Pennicap	Skip	Skip
G	Success+ Aza Direct	Skip	Carzol 12 oz	Success+ AzaDirect	Skip	Carzol 12 oz	Skip	Skip
H	Skip	Skip	Carzol 12 oz	Skip	Skip	Carzol 12 oz	Skip	Skip
I	Warrior+ Pennicap-M	Warrior+ MSR	Warrior+ Lannate	Warrior+ Diazinon	Warrior+ Lannate	Warrior+ Lannate	Warrior+ Diazinon	Warrior+ Lannate
J	Warrior	Skip	Carzol 12 oz	Success+ AzaDirect	Skip	Carzol 12 oz	Skip	Skip
K	Warrior	Skip	Lannate	Skip	Skip	Lannate	Skip	Skip
L	Warrior	Skip	Carzol 12 oz	MSR+ Diazinon	Skip	Carzol 12 oz	Skip	Skip
M	MSR+ AzaDirect	MSR+ AzaDirect	Carzol 12 oz	Skip	Skip	Carzol 12 oz	Skip	Skip
N	MSR+ AzaDirect	Warrior	Carzol 12 oz	Skip	Skip	Carzol 12 oz	Skip	Skip
O	Warrior	Warrior+ MSR	Warrior+ Lannate	Warrior+ Diazinon	Warrior+ Lannate	Warrior+ Lannate	Warrior+ Diazinon	Warrior+ Lannate
P	UTC ^a	UTC	UTC	UTC	UTC	UTC	UTC	UTC

^aUTC=Untreated check

Results

Carzol spray interval trial

Thrips control with Carzol was best at the 16-oz and 20-oz rates with a 7-day spray interval (Fig. 1). All of the Carzol rates were more effective when applied at weekly intervals rather than a longer interval. When the spray intervals and application rates (Fig. 2) were combined, there were no significant differences in thrips control due to Carzol application rates, but there were significant differences in thrips control due to spray intervals, with weekly applications significantly better than extended intervals (Fig. 3). There were no significant differences in total yield between any of the treatments; however, there were significant differences in colossal- and supercolossal-sized bulb (>4 inches) yield with different treatments (Fig. 4). The colossal and supercolossal yield was related to thrips populations with yields declining when thrips populations increased. Weekly application intervals gave significantly higher colossal and supercolossal bulb yield (Fig. 5) and significantly lower disease incidence (Fig. 6).

Carzol rotation trial

Weekly applications of only one insecticide are not a sustainable approach to thrips control, because resistance would quickly become a major issue. A number of insecticides were evaluated in a rotation sequence. Growers typically like to use a mix of at least two insecticides in an attempt to control thrips and to try to rotate insecticide classes. Sixteen rotation sequences (Table 1) were evaluated for thrips control, IYSV control, and effect on yield and quality. The five best rotations are listed in Table 2 and are labeled A-E.

Table 2. Five best insecticide treatments for a season-long program in onions. Malheur Experiment Station, Oregon State University, Ontario, OR, 2006.

	Week 1	Week 2	Week 3	Week 4	Week 5	Week 6	Week 7	Week 8
A	Warrior + MSR	Warrior+ Lannate	Warrior+ Lannate	Warrior+ Lannate	Warrior+ Lannate	Warrior+ Lannate	Warrior+ Lannate	Warrior+ Lannate
B	Skip	Skip	Skip	Carzol 20 oz	Skip	Skip	Carzol Lannate	Skip
C	Warrior	Warrior+ MSR	Lannate	Success+ AzaDirect	Carzol 20 oz	MSR+ Diazinon	Skip	Skip
D	Success + Aza Direct	Success+ AzaDirect	Carzol 12 oz	Skip	Skip	Carzol 12 oz	Skip	Skip
E	Warrior	Warrior	Carzol 12 oz	Warrior+ Lannate	Carzol 12 oz	Warrior+ Lannate	Skip	Skip

These rotation sequences are shown graphically in Figure 7. Rotation A is similar to the Carzol treatments in the previous trial and is not a sustainable program. Rotations C and D offer a good mix of insecticide chemistries and should give growers a sound approach to minimizing insecticide resistance.

Conclusion

The highest rates of Carzol (16 or 20 oz) were most effective. Weekly applications were more effective than 2-, 3-, or 4-week application intervals.

Weekly applications of Carzol or a Lannate + Warrior mix increased the yield of large-sized bulbs. Success, Aza Direct, Carzol, and Lannate offer different kinds of insecticide chemistries that can help minimize thrips resistance to insecticides.

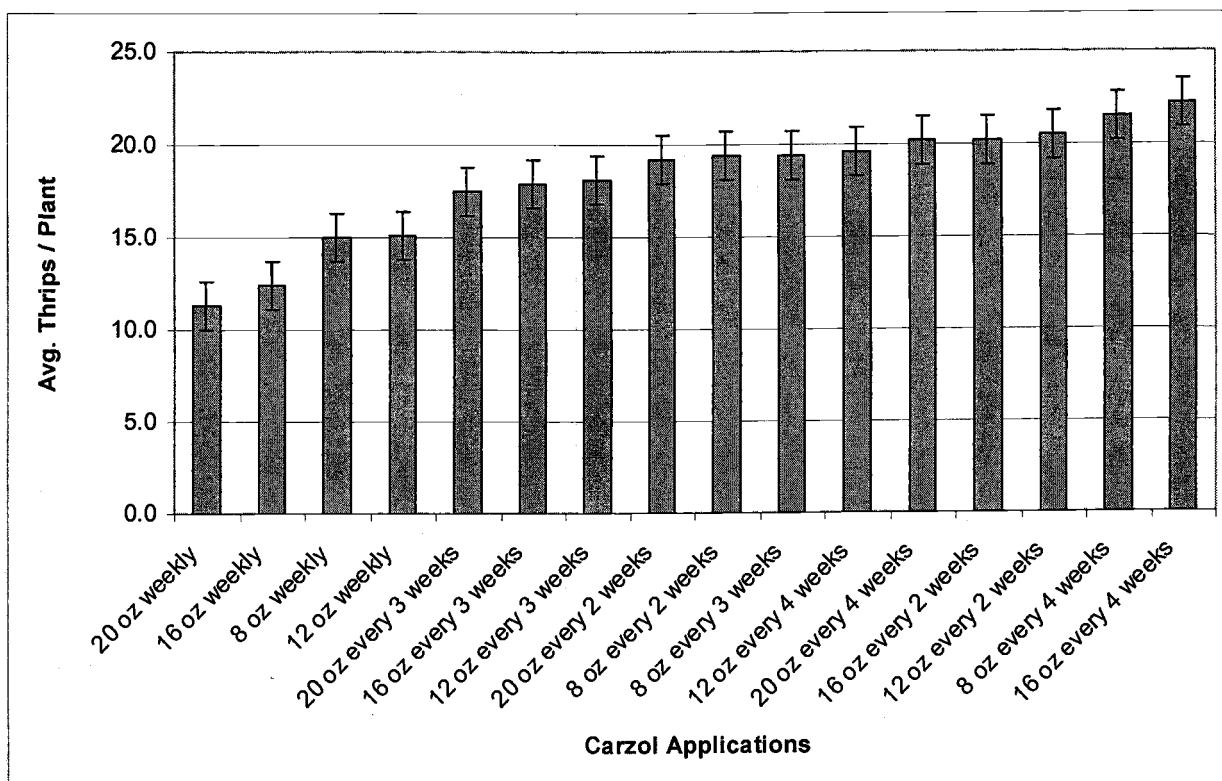


Figure 1. Average thrips season-long populations in onions. Malheur Experiment Station, Oregon State University, Ontario, OR, 2006.

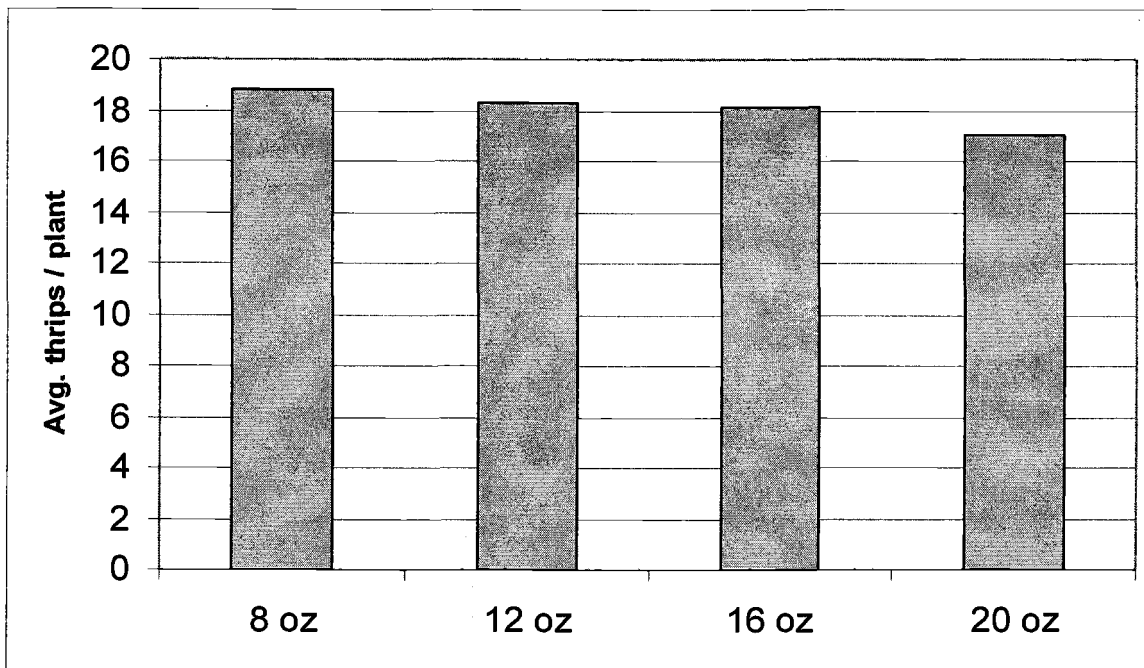


Figure 2. Effect of different Carzol rates on thrips populations in onions. Malheur Experiment Station, Oregon State University, Ontario, OR, 2006.

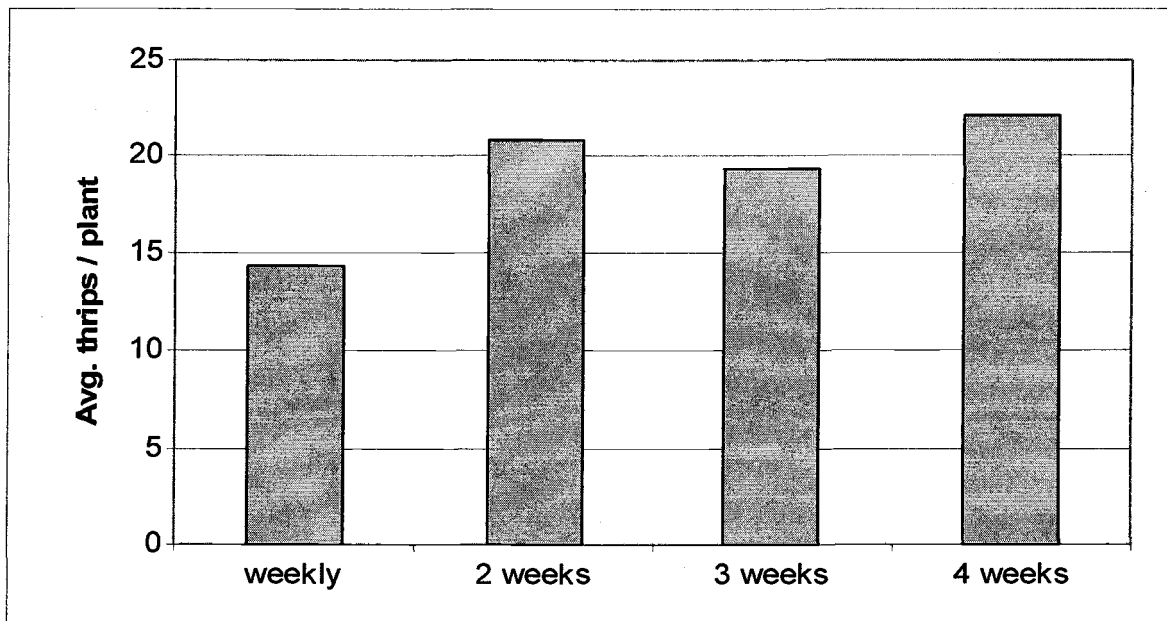


Figure 3. Thrips population vs. application interval. Malheur Experiment Station, Oregon State University, Ontario, OR, 2006.

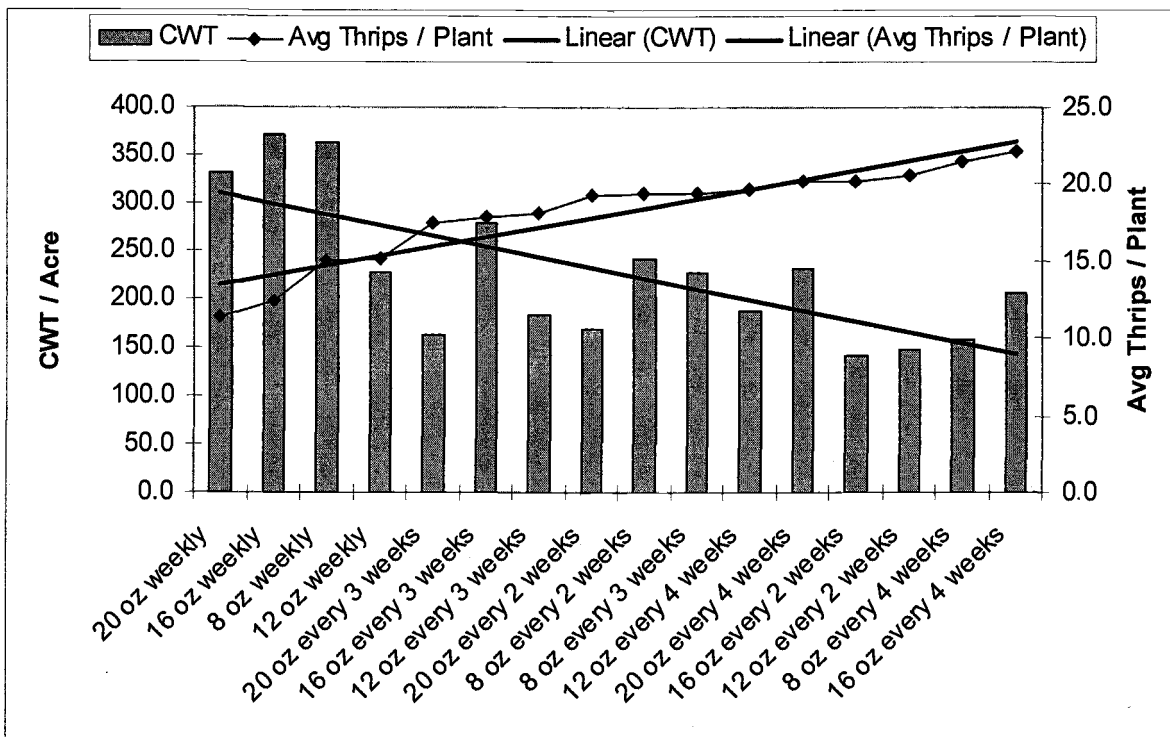


Figure 4. Colossal and supercolossal onions vs. average thrips population, Carzol residual trial. Malheur Experiment Station, Oregon State University, Ontario, OR, 2006.

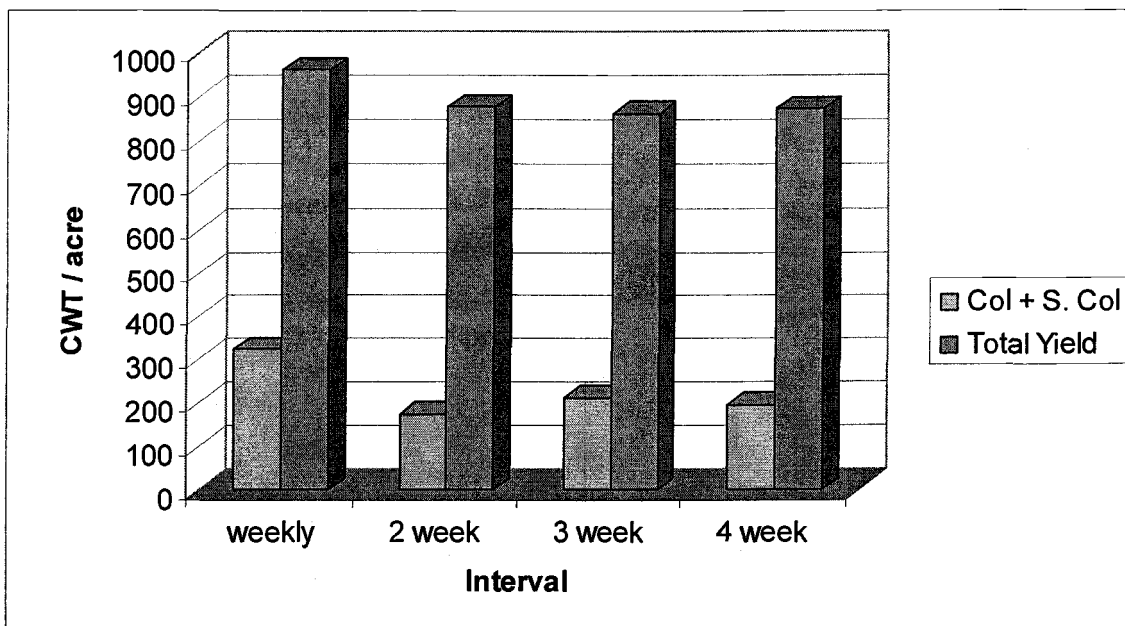


Figure 5. Application interval effects on onion yield. Malheur Experiment Station, Oregon State University, Ontario, OR, 2006.

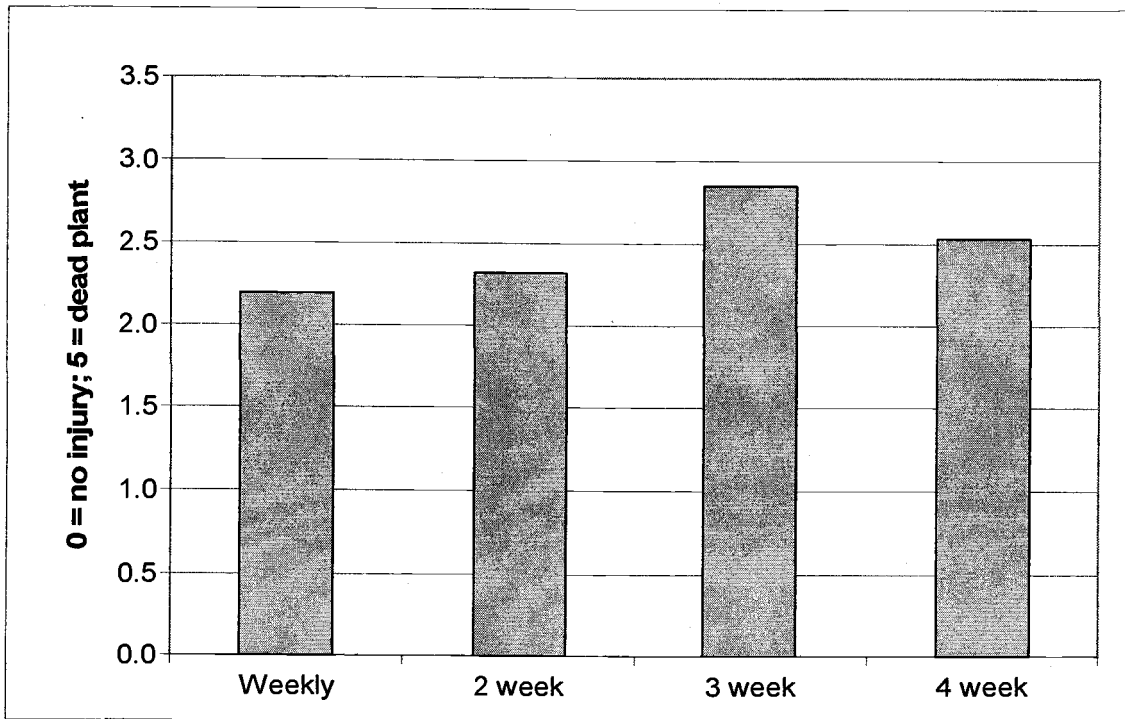


Figure 6. Iris yellow spot virus disease evaluation with different Carzol application intervals in onions. Malheur Experiment Station, Oregon State University, Ontario, OR, 2006.

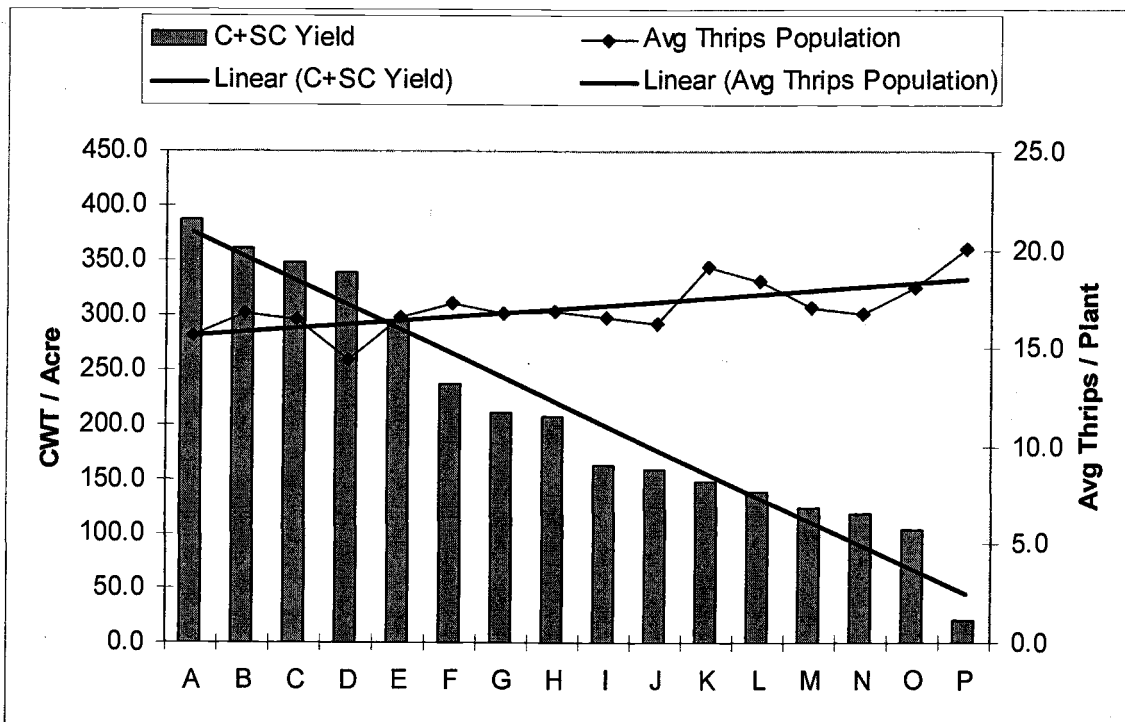


Figure 7. Colossal and supercolossal onion yield vs. average thrips population. Malheur Experiment Station, Oregon State University, Ontario, OR, 2006.