University of California Cooperative Extension Tulare County

Orchard notes

November/December 2000

Covercrops and Plum Nutrition

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Introduction

For the past several years we have been studying the effect of orchard floor cover on plum performance. In an expriment begun at the Kearney Ag Center in 1994 the following treatments were evaluated:

1. Residual herbicide – annual applications of residual herbicide (usually Surflan® and Goal®) applied from berm to berm with no cultivation.

2. Chemical mowing – periodic applications of Roundup® herbicide at low rates to kill emerged weeds in row centers. Annual applications of residual herbicide only to berm area.

3. Companion Grass® covercrop – a low growing mixture of perennial rye and fescue, which supplies no nitrogen and is mechanically mowed 2 to 4 times per year. Weeds on berm controlled with residual herbicide.

4. Strawberry clover covercrop – a low growing perennial clover that supplies some nitrogen and is mechanically mowed 2 to 4 times per year. Weeds on berm controlled with residual herbicide.

5. Winter legume covercrop – a traditional mixture of vetch, horse beans, and rye that supplies some nitrogen. Planted annually in the fall, and mowed and incorporated in the spring. Weeds on berm controlled with residual herbicide.

Water Infiltration

It is well known that floor management systems can impact water infiltration rate. Slow infiltration is a serious problem in some orchards on the east side of the San Joaquin Valley. It is often associated with irrigation water low in salt, and soils with inherently slow infiltration rates. When infiltration drops below a tenth of an inch (0.25 cm) per hour, it is difficult to get enough water into the root zone to satisfy the needs of the tree. In such locations water stress usually becomes evident by June, and increases in severity as the evaporative demand peaks in July and August.

In these studies both water infiltration rate and soil matric potential were measured. Infiltration rates were highest in the perennial strawberry clover, winter legume, and perennial rye. The residual herbicide and chemical mowing treatments had similar infiltration rates – which were about one-third to one-half lower than the other treatments. There were no significant differences in soil matric potential between treatments. This was likely due to the fact that the orchard was flood irrigated with more than adequate amounts of water.

Pest Management

There is much discussion about the relationship between orchard floor systems and pest populations. We were not able to measure any influence on pest populations other than mites, and after three seasons of study there were no consistent trends with respect to the mite populations of these treatments. In 1998 initial mite populations were highest in the Companion Grass, residual herbicide, and chemical mowing treatments, but within one to two weeks were the same for all treatments. In 1997 all treatments were essentially mite-free throughout the season. In 1996 there was an extremely high population of spider mites only in the clover treatment which required that both the trees and clover be treated with a miticide. Consequently, floor management systems do not seem to have a consistent effect on orchard mite populations.

Tree Performance

In general, tree yield was similar for all treatments except that in general the perennial clover treatment had the highest yields and the Companion Grass® treatment had the lowest yields. Much of the variation in yield was caused by differences in crop load, but it is expected that tree nitrogen status also played a large role in this. This concept is reinforced by the 1998 results in which the clover treatment, which had the highest leaf nitrogen concentration, had the largest sized fruit despite having a significantly greater crop load than the other treatments.

During this project the trees received no supplemental fertilization. Table 1 below summarizes the treatment effects on leaf nitrogen concentration. Perennial clover supplied significantly more nitrogen to the trees than the other treatments. Current UC recommendations for plums suggest that leaf nitrogen concentration ranges between 2.3% and 2.8%. Only the clover was satisfactory at maintaining tree N status in the upper portions of this range.

Table 1. Summary of results of different floor management systems on leaf nitrogen concentration, Royal Diamond plum.

Treatment	% Leaf Nitrogen (1997)	% Leaf Nitrogen (1998)
Perennial Clover	2.72 a	2.61a
Companion Grass®	2.46 b	2.39 b
Residual Herbicide	2.50 b	2.39 b
Winter Legume	2.60 ab	2.40 b
Chemical Mowing	2.53 ab	2.32 b

Numbers followed by the same letter are not statistically different at the 5% level. Mean separation between treatments by Duncan's Multiple Range Test.

Tree Nitrogen Status

Most of the differences in tree performance in the above described covercrop trial were believed to be caused primarily as a result of tree N status. Consequently, we began additional studies to better understand this relationship. In 1998 the covercrop treatments were concluded and the orchard cultivated and returned to semi-permanent cover. In April of 1999 we split the prior treatments into two groups. One group was left unfertilized and one was fertilized with ammonium nitrate at 300 pounds of nitrogen per acre. A summary of the results is presented below in table 2.

Table 2. Effect of supplemental nitrogen on Royal Diamond plum yield.

	Unfertilized	Fertilized
Fruit per Tree	794	767
Yield per Tree (pounds)	134.3	143.6
Fruit Weight (grams)	77.0	85.8
Leaf Nitrogen (%)	2.34	2.58

These results indicate the importance of proper N status on plum fruit yield. The greatest effect was seen in a dramatic change in leaf N% and as an 11% increase in fruit size. The current UC recommendation for plum leaf N concentration is 2.3% to 2.8%. These results indicate that it may be wise to research this more fully.

Winter Tree Fruit Meeting

Dinuba Memorial Hall, 249 S. Alta Avenue, Dinuba

Wednesday, December 6, 2000
8:00 am – 1:00 pm – Lunch following the meeting

8:00 – 8:45 a.m.	Registration – Preregistration Required *Moderator – Harry Andris, Fresno County Farm Advisor*
8:45 – 9:00	New Information on Katydid Biology and Control *Shawn Steffan, Research Associate, Kearney Ag Center*
9:00 – 9:15	Chemical Thinning of Plums *Scott Johnson, Pomologist, Kearney Ag Center*
9:15 – 9:30	New Materials to Control Thrips *Rich Coviello, Fresno County Farm Advisor*
9:30 – 9:50	Plum Pox – A Serious Threat to the Tree Fruit Industry of California *Maxwell Norton, Merced County Farm Advisor*
9:50 – 10:05	Understanding and Using Biological Control for San Jose Scale *Kent Daane, Entomologist, Kearney Ag Center*
10:05 – 10:30	Break
10:30 – 10:45	Keeping Trees Short – Is it Economical? *Kevin Day, Tulare County Farm Advisor*
10:45 – 11:00	Relating Peach Fruit Size and Quality to Characteristics of the Bearing Shoot *Ted DeJong, Pomologist, UC Davis*
11:00 – 11:15	Is Carob Moth a Pest of Stone Fruit? *Dick Rice, Entomologist, Kearney Ag Center*
11:15 – 11:30	Using a "Softer" Approach to Stone Fruit Pest Management *Shawn Steffan, Research Associate, Kearney Ag Center*
11:30 – 11:45	Powdery Mildew Control *Beth Teviotdale, Plant Pathologist, Kearney Ag Center*
11:45 – 1:00	LUNCH – Catered by The Safari Club Restaurant

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Cost: $20 per Person/includes lunch and a printed proceeding.
Preregister no later than Monday, November 27, 2000.
Note: Payment will be accepted at the door – but no guarantee of lunch.

We have applied for 3 hours of PCA/CCA Credit.

Send checks payable to
UC Regents to:
c/o JoAnn Coviello
Kearney Agric. Center
9240 S. Riverbend Avenue
Parlier, CA 93648

For further information contact JoAnn Coviello, (559) 646-6525.

Name(s) _____

Address _____ Amount _____