Organic Research, Western Colorado Research Center at Rogers Mesa, Hotchkiss, Colorado.


Weed competition has been shown to reduce growth and production of young fruit trees, however, little work had been done to examine the effects of weeds on mature trees. This three year study examined the effect of six treatments; 1) a mowed control (grower standard practice), 2) flamer, 3) landscape fabric, 4) shredded paper mulch, 5) mowing with material thrown into the tree row , and 6) shredded bark mulch, on weeds and their subsequent effect on tree growth, fruit size and productivity. Results showed that although yields were generally lower in the mowing treatment, the cost of labor for yearly application of the paper mulch, the highest yielding treatment, did not offset the yield gain over the mowing treatment. Fruit quality and tree growth were not significantly less in mowing treatment versus the paper mulch treatment.

Investigation of Organic Weed Control Methods

Weeds and weed control is one of most crucial and cost/labor-intensive aspects for organic vegetable growers in western Colorado. Unchecked weeds compete strongly with cash crops for water, nutrients and light and can greatly reduce yields and income. Organic vegetable growers spend a significant portion of their production budgets on weed control measures be it for plastic mulch or mechanical (tractor) cultivation coupled with manual (hand hoeing) weed control in their vegetable crops. This two-year study examined the efficacy of using corn gluten meal (CGM), a by-product of corn milling and an organic germination inhibitor, in organic broccoli production. The costs and benefits of seven weed control treatments were evaluated. The seven treatments were 1) plastic mulch, 2) hand weeding, 3) CGM at ½ ton ac⁻¹, 4) CGM at ¼ ton ac⁻¹, 5) CGM at 1 ton ac⁻¹ ½, ¾, and 1 ton GCM applied in a single pre-transplant application), 6) GCM at 1.5 tons ac⁻¹ in a split application and 7) no weed control. A winter wheat/winter rye cover crop was planted in the second week of September prior to the cropping season and tilled into the soil one month prior to transplanting broccoli in mid-May. The two best treatments were plastic mulch and ½ ton ac⁻¹ CGM treatments. Results showed that although the plastic mulch had significantly fewer weeds in both years, the ½ ton ac⁻¹ CGM treatment had similar marketable yields in 2004 and 2005 as the plastic mulch. Net returns were similar for both treatments in 2004 at about $15,000 ac⁻¹. However, net returns in 2005 were significantly higher in the ½ ton ac⁻¹ CGM treatment than in the plastic mulch. The difference in marketable yield and net return in 2005 are probably due to climatic conditions in that year. In 2005, high temperatures were relatively cool through mid-June (72°F) and quickly turned relatively hot (90°F) within a week, which was probably very detrimental to broccoli growth under the plastic mulch. It was also found that higher rates of CGM did not improve weed control over the low rate. This study showed that low rates of CGM, although not as effective as plastic mulch at controlling weeds, product similar net returns without the disposal or environmental problems associated with plastic mulch vegetable culture.

The Use of on-Farm Cover Crops for Fertility in Organic Fruit Production
This three-year replicated study in western Colorado examined several organic fertility treatments on young peach trees to determine if on-farm sources of fertility would be adequate for fruit production and how on-farm sources compared to commercial organic fertilizer. The treatments were 1) Alfalfa/grass mix, grown in the alleyways and mowed (mow), 2) Alfalfa grown on a neighboring field and applied in the tree row at 2 tons ac\(^{-1}\) (alf imp), 3) berseem clover grown in the alleyway (BC), 4) yellow sweet clover grown in the alleyway (YSC), 5) commercial organic fertilizer (12-2-0) applied in the tree row at a rate of 100 lbs N ac\(^{-1}\) (CF) and 6) commercial organic fertilizer (12-2-0) applied in the tree row at a rate of 100 lbs N ac\(^{-1}\) plus ½ ton of alfalfa ac\(^{-1}\) (CF alf). Soil samples were taken every two weeks through the growing season and analyzed for ammonium-nitrogen (NH\(_4\)-N) and nitrate-nitrogen (NO\(_3\)-N) to determine N release times from the various treatments. Soil samples were taken prior to the start of the study and in October of each season and analyzed for all plant nutrient levels and organic matter content. A spring frost in 2002 precluded fruit harvest. Fruit yield, fruit number data were collected for 2003 and 2004. Fruit yield was low in 2003 because the trees were not yet in full production and there were only significant differences in yield and the alf imp treatment was significantly higher than the mow treatments. In 2004, there were no significant differences in yield for any treatments. The trend in organic matter levels was a lowering for all treatments from an average of 3.8% prior to the start of the study to an average of 3.0% at the conclusion of the study. Soil nutrient analysis also showed sharp decline in most soil nutrient levels in all treatments. This study showed that nutrient inputs need to be increased to maintain or improve soil nutrient adequacy levels over the long-term for adequate fruit tree production.

Variety Trial of Organic Green Beans for Seed Production

We tested four green bean varieties at Rogers Mesa Research Center in western Colorado, under organic conditions, to determine which varieties were best-suited to local climatic conditions for organic seed production. This was a replicated study four times each year. The four varieties were Hystyle, a bush type bean, Climber, Rattlesnake, and FM-1. The three vine type beans were trellised. The Hystyle did not germinate well in either year, even after replanting, although the plants that germinated and grew did well and would be good for production fields if the germination problem could be overcome. Of the three other varieties Climber produced significantly more than Rattlesnake or FM-1, which did not have significantly different yields between the two.

Organic Seedless Table Grape Variety Trial

This study is examining six cold-hardy seedless table grape varieties in a replicated study was planted in 2003. The six varieties are Himrod (green grape), Mars (black), Einset (red), Canadice (red) Vanessa (red) and Reliance (red). The study had four replicates of 24 plants each in a randomized complete block. In 2005, the first fruiting year, high European Paper Wasp populations caused extensive raisining in all varieties but the most damage was in the four red varieties. To date plant survival has been an issue (Table 1).

<table>
<thead>
<tr>
<th>Variety</th>
<th>Survival</th>
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<td>Himrod</td>
<td>88%</td>
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Mortality is thought to be due to inadequate irrigation under the hot and dry summer conditions of western Colorado in the first year after planting when root systems were small.

**Organic Brewing Hops Variety Trial**

This variety trial was planted in 2003 with three replications of ten brewing hop varieties under organic conditions. New varieties are added each year and we now have a total of 20 varieties, these include: Brewers Gold, Cascade, Centennial, Challenger, Chinook, Crystal, Fuggle, Hallertauer, Magnum, Mt. Hood, Northern Brewer, Nugget, Perle, Canadian Red Vine, Sunbeam, Ultra, Vanguard, Viking, Vojvodina and Willamette. Of these varieties the best producers have been Chinook, Centennial, Canadian Red Vine and Nugget. Larger plantings of Chinook, Centennial, Mt. Hood were planted in 2005 to better estimate field scale yield and economic potential and should produce modest yields in 2006.