

VI- SUMMERY

This investigation was conducted during two successive seasons, 1996 and 1997 to study the effect of different soil management systems on weeds control, vegetative growth, fruiting and fruit quality of bearing Anna apple trees. The trees were (15 years old budded on Molling Merton 106 rootstock) nearly similar in vigor, and grown on clay loam soil. The treated plots were irrigated with closed basin surface system and cleaned from all weeds before starting the study, The trees were treated with the following treatments:

I- Clean cultivation which involved.

Twice cultivation, once clean cultivation and no cultivation.

II- Mulch cultivation: which included field crop residues and rice straw.

III- Herbicide treatments: which comprised Glyphosate, Afalon's and paraquat. These, herbicides were used according to the recommended rates.

Anyhow, these treatments were replicated three times and each replicate was represented with two trees.

The present investigation included the following studies:

1- Weeds control.

2- Horticultural measurements: vegetative growth, leaf nutrients content, fruit set and dropping, yield and fruit quality.

3- Herbicidal fruit residues.

- 4- Microbial organisms under mulch cultivation system: such study involved bacteria, actinomycetes and fungi counts in the soil as well as the decomposition of mulch materials used.
- 5 - Cost/benefit of different soil management systems used.

The results could be summarized as follow:

VI-1- Weeds control:

- 1- Annual weeds were completely controlled by mulching treatments as compared with the other soil management systems used. Field crop residues treatment was more promising than rice straw mulch in decreasing dry weight of either broad or grassy weeds.
- 2- Twice clean cultivation (control) was more effective in weed control parameters than other clean cultivation treatments used.
- 3- Glyphosate herbicide treatment was more promising in get rid of grassy weeds via decreasing dry weight and total dry weight of weeds followed by Afaon's.

VI-2 - Horticultural measurements:

VI-2-a- Vegetative growth:

- 1- Mulching treatments induced largest increase in number of shoots, shoot length, leaf area and leaf dry weight, followed by clean cultivation and herbicide treatments. Furthermore, rice straw mulch treatment was most superior than field crop residues in encouraging vegetative growth of trees.
- 2- Twice-clean cultivation treatment (control) was promising in increasing number of shoots, shoot length and leaf dry weight as

compared with the other two clean cultivation treatments used. While leaf area was only increased by one clean cultivation treatment.

- 3- Trees treated with Glyphosate herbicide succeeded in increasing number of shoots, shoot length and leaf dry weight than the other two herbicide treatments.

VI-2-b-Leaf nutrient contents

I-As percentage and p.p.m.

- 1- Rice straw mulch succeeded in increasing leaf N, K and Zn among other treatments under study while failed to increase leaf P, Ca, Mg and Fe, simultaneously.
- 2- Clean cultivation treatments increased successfully leaf Mg and Mn while they had intermediate effect on leaf N, P, Ca, Fe and Zn contents.
- 3- Twice clean cultivation treatment (control) induced an increase in leaf Ca and K. nutrients while once clean cultivation treatment increased only Mg and Fe nutrients. No cultivation treatment, on the other hand, stimulated statistically leaf Zn and Mn nutrients.
- 4- Herbicide treatments increased leaf P, Ca and Fe while failed to increase leaf N, Zn and Mn.

II- As absolute value (mg/leaf):

- 1- Field crop residues increased mostly leaf N, P, Ca, Mg and Fe contents as compared with rice straw mulch.

- 2- Herbicide treatments succeeded only in raising up leaf P nutrient. In this respect; Glyphosate herbicide increased leaf N and P, while paraquat raised up leaf K, Ca and Mg nutrients.
- 3 - Once clean cultivation system surpassed no cultivation treatment in increasing leaf N, P, Ca, Mg and Fe contents.

VI-2-C- Fruiting:

I- Fruit set and dropping.

- 1- Mulch treatments induced highest increase in fruit set and lowest percentage of fruit dropping followed by clean cultivation and herbicide treatments in a descending order. In this respect, rice straw mulch treatment was more promising than filed crop residues treatment in increasing fruit set and decreasing fruit drop.
- 2- Twice clean cultivation treatment (control) surpassed the other two treatments of clean cultivation under study in increasing. Fruit set and decreasing fruit drop.
- 3- Afolon's herbicide treatment was more preferable in increasing fruit set and decreasing fruit drop as compared with Glyphosate and paraquat, herbicide treatments.

II- Yield and fruit quality

a- Yield

- 1- All treatments increased the yield. In this respect, mulch treatments caused the highest effect in increasing the yield followed by

herbicide treatments. While the lowest increase was obtained from clean cultivation treatments.

- 2- Significant difference was nil between field crop residues and rice straw mulch.
- 3- Once clean cultivation treatment was the highest among the other two clean cultivation treatments used
- 4- Glyphosate herbicide treatment succeeded in raising up the yield significantly among the other two-herbicide treatments.

b- Fruit quality:

I- Fruit weight.

- 1- Fruit weight of mulched trees was heaviest remarkably as compared with both clean cultivation and herbicide systems
- 2- Rice straw mulch gave fruits heavier in weight than those of field crop residues.
- 3- Once clean cultivation treatment succeeded in producing fruits heaviest in their weight comparing with those of other two clean cultivation treatments used.
- 4- Glyphosate herbicide treatment produced fruits heaviest in their weight followed by Afalon's.

II- Fruit size.

- 1- Mulch treatments increased fruit size visually followed by clean cultivation treatments. Herbicide treatments, on the other hand, failed to realise any success in this respect.
- 2- Field crop residues surpassed rice straw mulch in increasing fruit size.

- 3- Under no cultivation, trees gave smallest fruits in their size as compared with both twice-clean cultivation and once clean cultivation treatments.
- 4- Paraquat herbicide succeeded in increasing fruit size than those of both Glyphosate and Aflon's herbicides.

III- Fruit firmness:

- 1- Fruit firmness did not affect with different soil management, systems used.

Nevertheless,

- a- Rice straw mulch treatment gave fruits more soft than those of field crop residues.
- b- Once clean cultivation treatment gave fruits more soft as compared with both twice-clean cultivation and no cultivation treatments.
- c- Herbicide treatments had no statistical effect on fruit firmness.

2- Chemical properties

a- Titratable acidity.

- 1- Mulch and herbicide treatments gave generally lowest values of acidity as compared with clean cultivation treatments.
- 2- Rice straw mulch gave fruits with lowest values in respect of those of field crop residues.
- 3- Once clean cultivation treatment succeeded in decreasing acidity in fruits followed by twice clean cultivation treatment.
- 4- Trees received Glyphosate herbicide gave fruits poorest in acidity comparing with the other two herbicide treatments.

b- T. S. S.

1- No significant difference was noticed between fruit T. S. S. values of the three soil management systems.

However,

- a- Rice straw mulch gave fruits with higher values of T. S. S. than the corresponding ones of those treated with field crop residues.
- b- No significant difference was noticed between clean cultivation treatments.
- c- Glyphosate herbicide treatment produced fruits with higher values of T. S. S. as compared with the other two herbicides used in this study, which were statistically similar in their values.

c- Total soluble sugars.

- 1- Mulch treatments caused highest increase in fruit total soluble sugars content in respect of both herbicide and clean cultivation systems, which they were more or less similar in their values in this concern. In addition, rice straw mulch gave fruits with higher amount of total soluble sugars than those of field crop residues.
- 2- Fruits of once clean cultivation treatment had highest amounts of total soluble sugars as compared with the other two treatments in this field
- 3- Afolon's augmented total soluble sugars comparing with the other two herbicides under study.

d- Starch.

- 1- Mulch treatments gave lowest values among the other two systems of soil management which they (as average) nearly similar in their values. In this concern, fruits of field crop residues treatment

were higher in starch content comparing with those of rice straw treatment.

- 2- Twice clean cultivation treatment had fruits with highest amounts of starch as compared with the other two clean cultivation treatments under study.
- 3- Paraquat herbicide treatment increased fruit starch among the other two herbicides used.

e- Starch/sugars ratio.

- 1- Mulch treatments gave lowest values of starch/sugars ratio as compared with both clean cultivation and herbicide systems. Moreover, field crop residues increased starch/sugars ratio over rice straw mulch.
- 2- No cultivation treatment gave the highest value of starch/sugars ratio as compared with other clean cultivation treatments used.
- 3- Paraquat herbicide treatment gave mostly fruits with higher starch/sugars ratio in respect of the other two herbicides under study.

VI-3- Herbicidal fruit residues.

Both Glyphosate and Paraquat herbicides had, no residues in Anna apple fruits. On the contrary, residues of Afaon's herbicide was obtained in fruits of treated trees.

VI-4- Soil microbial organisms.

- 1- Mulch treatments increased the activity of bacteria in the soil as compared with twice clean cultivation (control) treatment.

- 2- Field crop residues mulch was more effective in increasing total bacterial and actinomycetes counts in the soil than rice straw mulch, which was more promising in increasing fungi activity.
- 3- Growth period of total bacteria and actinomycetes counts in mulched soil increased till 120 days and 150 days in fungi then decreased afterwards up to 180 days under control treatments. Growth period of actinomycetes and bacteria was extended up to 120 days, while it was 150 days in fungi.
- 4- C/N ratio in mulch sources used in this study was high during January and February then decreased gradually till June.
- 5- Rice straw mulch had higher C/N ratio than, the field crop residues mulch mainly during the period from April to June.

VI-5- Cost/benefit of different soil management systems:

- 1- Mulch system was more profitable for Anna Apple growers followed by herbicide treatments as compared with clean cultivation treatments.
- 2- Field crop residues gave highest net return than rice straw mulch.
- 3- Glyphosate herbicide surpassed the other two herbicides used in this study in the highest net return while paraquat herbicide took the other way around in this respect.
- 4- Once clean cultivation treatment was most superior in increasing net return among other two clean cultivation treatments under study.

