

<http://www.pjbs.org>

PJBS

ISSN 1028-8880

**Pakistan
Journal of Biological Sciences**

ANSI*net*

Asian Network for Scientific Information
308 Lasani Town, Sargodha Road, Faisalabad - Pakistan

Effect of Various Soil Management Practices on the Vigour Yield and Quality of Sky Spur Apple Cultivar

Muhammad Akram Nasir, Muhammad Afzal and Shakil Ahmad.
Hill Fruit Research Station, Sunny Bank, Murree

Abstract: The various soil management practices were clean cultivation, Dow-pan weedicide spray, black polyethylene covering, grass mulching and sod culture. Maximum yield per plant in terms of number of fruits and vigour was recorded from the plants where black polyethylene covering used and minimum in case of sodculture. But yield in terms of individual fruit weight and weight of fruit per tree was maximum in case of grass mulching. Clean cultivation and Dow-pan Weedicide spray were almost at par to each other. However Fruit size, Total soluble solids and acidity were not responded at all. Conclusively grass mulching and black polyethylene covering proved the better than all other soil management practices.

Key words: Soil, management practices, apple, yield, vigour, quality, Pakistan

Introduction

Soil management practices followed in orchards are intercropping, clean cultivation, cover crops, mulching, weedicide spray and sodculture. Admittedly, whatever soil management practice be adopted the ultimate aim is to control weeds. Besides decreasing the productivity of the field crops and gardens, the weeds are undesirable on account of their competitive and allelopathic conditions. Fruit gardens are ordinarily full of weeds having got little or no cultivation at all. This results in loss of soil fertility and moisture which otherwise is needed by the fruit plants. It is common observation that orchards which are not properly managed to remove competing weeds are generally declining in health and productivity. In Murree hills, excessive rainfalls resulted in the ground surface runoff, render the soil poor nutritive supply source there-by resulting in sub-optimal plant growth and poor yield turnouts of all fruit crops especially Apple. Thus the present project was initiated to find out the influence of different soil management practices adopted, under Murree hills climatic conditions in the full grown apple orchards on the vigour and productivity of Sky Spur cultivar. The use of different types of mulches have been greatly advocated. Hussain *et al.* (1990) reported that fruit size, TSS percentage and scion girth remained highest in grass mulched apple plant of Nugget cultivar. However no measurable effects were seen on the height of the plant. Similarly Main and Nasir (1987) proved berseem intercropping the best in young mango among all other soil management practices. Holubowicz *et al.* (1978) also, reported that grass mulched apple tree gave better coloured fruits while studying the plastic covering of apple tree cultivars Cox's Orange Pippin and Golden Delicious apple. Similarly Trzein and Warzee (1978) concluded that black polyethylene gave higher yield as compared to those on bare soil. The nutrient loss may be replaced by supplemental addition in the form of fertilizers and manures. Nitrogen may also be added by the use of leguminous crops through the process of nitrogen fixation as reported by Day and Witty (1977) that "only a fraction of the total agriculture need for nitrogen comes from natural or synthetic fertilizers. The remainder is satisfied largely through the biological fixation of atmospheric nitrogen". Similarly Rashid (1986) reported that mulching play dual role of controlling the soil erosion and adding organic matter in the soil.

Materials and Methods

The effect of various soil management practices on the vegetative growth and physico-chemical characters of apple cv. Sky Spur was studied at the Experimental Garden, Hill Fruit Research Station, Sunny Bank, Murree during 1997-99. Forty full grown plants of uniform size and age of Sky Spur apple variety were selected. The experiment was laid out Completely Randomized Block Design. Five treatments with four replication and in each treatment there were two trees. The various

treatments were given according to the following schedule.

Sr. No.	Treatments	Time/method
1.	Clean cultivation.	Hoing under the canopy of plants during April, June and September, 1997, 1998 and 1999.
2.	Weedicide spray.	Dow-Pan M weedicide application during April, June and September for each year.
3.	Polyethylene covering.	Covered with black polyethylene the soil under the Canopy of tree from April to October during each year.
4.	Grass Mulching.	Soil under the canopy of tree was covered with 30 cms thick layer of dried grass.
5.	Sodculture.	The grass and other weeds were allowed to grow during the entire period of study.

Stem girth was measured in centimeters by wrapping a measuring tape around the stem 10 cms above the ground and height of the plant was measured in meters with the help of measuring rod. Spread (canopy) of the plants was measured in meters on both sides i.e., north-south and east-west. Average were then calculated by adding both values and dividing by two. Size (length and diameter) of fruit was measured in cm with the help of vernier Callipers. Yield was determined both in number and total weight per tree. Acidity was determined as described by AOAC (1980). Total soluble solids were determined by Abb's Refractometer. Analysis of variance techniques were adopted at five % probability for data processing (Steel and Torrie, 1990).

Result and Discussion

Plant vigour: The data on stem girth of full grown apple plants collected during the study period are presented in Table 1. During first year various soil management practices did affect the stem girth of the plants as the results were significant. Stem girth of plants was thickest (44.25 cm) in black polyethylene covering as compared to all other treatments. Minimum Stem girths were noted where sodculture was practiced. Almost similar trend was found from the results obtained during second year.

The effect of different soil management practices on the height in meters during both years found significant (Table 1). Maximum height (3.64 meters) was measured from the plants where black polyethylene was used followed by clean cultivation (3.54 meters). Minimum height was noted from the plants where sodculture (2.79 meters). However grass mulching and weedicide spray were found intermediocres with means of 2.94 and 2.89 meters per plant respectively. Almost same trend was noted during the second year. These findings are also, supported by Hussain *et al.* (1990) that no measurable effects of grass mulch were noted on height of plant.

Like stem girth and height significantly maximum spread was

Table 1: Effect of various soil management practices on the vigour, yield and quality of apple fruit

Characters	Year	Treatment Means					LSD at 5%
		Clean/cultivation	Weedicide spray	Polyethylene covering	Grass Mulching	Sodculture	
Stem girth (cm)	1998	38.00	39.62	44.25	38.50	32.75	2.55
	1998	39.10	41.50	46.00	40.50	35.00	2.98
Plant Height (M)	1998	3.54	2.89	3.64	2.94	2.79	7.34
	1999	3.58	2.96	3.72	3.00	2.85	6.63
Plant Spread (M)	1998	2.54	2.45	2.64	2.93	2.34	2.40
	1999	2.56	2.50	2.68	2.58	2.38	2.17
Fruit Number (Per plant)	1998	171.00	185.00	295.00	244.00	66.00	3.85
	1999	85.00	120.00	172.00	195.00	45.00	2.17
Fruit Length (cms)	1998	6.15	6.25	6.45	6.97	5.67	--
	1998	5.30	5.60	5.20	5.90	5.05	--
Fruit diameter (cms)	1998	5.27	5.87	5.52	6.25	4.50	--
	1999	5.10	5.20	5.30	5.70	5.20	--
Fruit Weight (g)	1998	154.60	162.75	170.92	193.50	146.50	3.49
	1999	155.00	163.00	170.00	190.00	147.00	7.01
Yield (Kg/plant)	1998	12.98	20.65	50.42	57.20	11.22	2.83
	1999	21.00	30.00	29.24	37.05	12.00	8.21
Total Soluble Solids (%)	1998	11.60	11.90	12.20	12.50	11.24	--
Acidity (%)	1998	0.33	0.34	0.27	0.32	0.33	--
	1999	0.31	0.32	0.30	0.31	0.32	--

noted in plants where the black polyethylene covering (2.64 meters) used followed by clean cultivation (3.54 meters) and grass mulching (2.93 meters). Minimum spread was noted in sodculture followed by weedicide with means of 2.34 and 2.45 meters per plant respectively (Table 1). Same results were noted during the second year.

Fruit size and Weight: Fruit size both in length and diameter as effected by various soil management practices during the entire period of studies has not found significant (Table 1). During 1998, the fruit length and diameter of Sky Spur apple fruit ranged from 5.67 to 6.97 cms and 4.50 to 6.25 cms respectively. Almost similar trend was noted during 1999 regarding these both parameters.

The effect of various soil management practices on the weight of apple fruit has been found significant during 1998 (Table 1). Heavy fruits were harvested from the trees where grass mulching (193.50 g/fruit) was used followed by black polyethylene covering (170.92 g/fruit) and weedicide spray (162.72 g/fruit). Minimum fruit weight was noted of fruits harvested from the trees where sodculture (146.50 g/fruit) was practiced followed by clean cultivation (154.60 g/fruit). Same results were noted during the second year.

Yield: The effect of different soil management practices on the yield in term of number of fruit per plant during 1998 and 99 were found significant (Table 1). During first year maximum number of fruits (295/plant) were counted from the trees mulching (244 fruits/plant) and weedicide spray (185 fruits/plant). Minimum yield was noted from the plants where sodculture (66 fruits/plant) was adopted followed by clean cultivation (171 fruits/plant). Yield of the trees during second year also affected in the same fashion. Our results also fall in conformity with the conclusion of Trzein and Warzee (1978) that black polyethylene gave higher yield of Golden Delicious and Cox's Orange Pippin apple cultivars.

The yield data presented in Table 1 indicated that maximum yield on weight basis per tree was obtained from the trees where grass mulching (57.21 kg/tree) adopted followed by black polyethylene (50.42 kg/tree) and weedicide spray (20.65 kg/tree). The lowest yield was noted in plants placed either under sodculture (11.22 kg/tree) or clean cultivation (12.98 kg/tree). Similar trend was noted during the next year. Grass mulching not only helps to control the soil erosion but also conserve the soil moisture besides its additional benefit prevention of soil organic matter wastage.

Quality: It is evident from Table 1 that total soluble solids as affected by various management practices during 1998 and

1999 have been found to be non significant showing there by lack of any influence on the quality on apple fruit. Total soluble solids ranged from 11.24 to 12.50% and 9.40 to 12.30% during first and second year respectively.

Acidity of the apple fruit did not responded at all during the both years of studies (Table 1). During 1998 the acidity ranged from 0.27 to 0.34% while during 1999 the range was 0.30 to 0.32%. Present results pertaining to TSS, are contradict to Hussain *et al.* (1990) that scion girth, height and TSS percentage increased in Nugget cultivar with grass mulching. In conclusion it may be stated that yield and plant vigour showed significant response to various soil management practices and were especially superior where either black polyethylene covering were used or grass mulching. Because grass mulching and polyethylene covering controlled the weeds by shading and also, preserve the soil moisture from evaporation result and then these both practices are conducive to micro-organism development. In contrast to these soil management practices poor performance of sodculture, the weed flourish freely and compete for nutrition with garden plants. Like sodculture continuous application of weedicide spray badly affected the flora of soil. Inter-culture showed intermedicore in its response because seasonal weeds are destroyed, better aeration for nitrification and retention of soil moisture, thus enhance the nutrient availability of plants.

References

- A.O.A.C., 1980. Official methods of analysis. Association of official analytical chemists. 13th editions, Washington D.C.
- Day, J. A. and J. F. Witty, 1977. Novel aspects of nitrogen fixation. Outlook on Agriculture, 9: 180-185.
- Holubowicz, T. J. Waski and H. Galinska, 1978. Effect of orchard soil management on cropping of old apple trees. Hort. Abst., 48: 76.
- Hussain, M. Ahmed, A. R. M. Chaudhry and A. R. Khan, 1990. Effect of different cultural practices on the nugget variety of apple. Pb. Fr. Jour., 43: 42-48.
- Main I. H. and M. A. Nasir, 1987. Effect of different soil practices on the growth of young mango plants of Fajri cultivar. Pb. Fr. Jour., 40: 18-24.
- Rashid, A., 1986. Effect of cultural practices on the performance of Nugget Apple. Ann. Rep. Hort. Res. Inst. Fsd., pp: 169.
- Steel, R. G. D. and J. H. Torrie, 1990. Principles and procedures of statistics, Mc Graw Hill Book Co., New York.
- Trzein, S. and T. A. Warzee, 1978. The influence of plastic cover at the base of apple trees cvs. Cox's Orange Pippin and Golden Delicious. Hort. Abst., 48: 7852.