

IMPACT OF DIFFERENT MULCHES ON WEED FLORA AND YIELD OF MAIZE

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Abstract

Field study was conducted at Agricultural Research Institute Tarnab, Peshawar during Kharif 2007 to investigate the effectiveness of various weed control measures in maize crop. The experiment was laid out in Randomized Complete Block (RCB) design, having eight treatments and four replications. The treatments were wheat straw, saw dust, polyethylene (white), polyethylene (black), newspaper, Primextra Gold 720SC @1.0 lit ha⁻¹, hand weeding and weedy check were also included in the studies. Data were recorded on number of kernels cob⁻¹, 100-kernel weight (g), biological yield of maize (t ha⁻¹) and grain yield (t ha⁻¹). For controlling weeds, the maximum grain yield was recorded in Primextra Gold 720SC, polyethylene (black), hand weeding and polyethylene (white) with grain yield of 2.98, 2.48, 2.06 and 2.03 t ha⁻¹, respectively. Minimum yield (1.36 t ha⁻¹) was recorded in the weedy check plots.

Introduction

Maize (*Zea mays* L.) is an annual, short day, cross pollinated plant of the world. It belongs to family Poaceae. The maize plants have erect stem or stalk which bears alternate leaves. The leaf consists of the blade, sheath and collar like ligule. It is normally monoecious with staminate and pistillate flowers produce on the tassel and ear. The stalk is made up of nodes and internodes. The internodes are straight and nearly cylindrical in the upper part of the plant, but alternately grooved on the lower part. In Pakistan maize is increasingly gaining an important position in crop husbandry because of its higher yield potential and short growth duration. It is rich source of food and fodder. Maize is also used in industries for manufacturing of corn oil, corn starch, corn flakes, corn syrup, lactic acid, alcohol etc.

In Pakistan, maize is grown over an area of 1042.0 thousands hectares with an annual production of 3109.6 thousand tons with average yield of 2984 kg ha⁻¹. In NWFP, the area under maize was 492.2 thousands hectares which produced 782.4 thousand tons with provincial average yield of 1590 kg ha⁻¹ (Anon., 2007).

Maize is one of the most important crops in the world grown over an area of 132 m. ha with a production of 570 m.t. In Pakistan the production of maize is low as compared to other countries of the world. Various factors are responsible for this low production, among them high weed infestation, poor weed management practices and improper planting methods are common problems. Weeds highly infested maize crop both in irrigated as well as rainfed areas. They reduce crop yield from 20-40% depending upon weed species and density (Ashique *et al.*, 1997). Weeds compete with crops for light, moisture, space and plant nutrients and consequently interfere with the normal growth of crops. It is known that there is a critical crop-weed competition period with grain losses reaching between 35 and 70% if weeds are not controlled (Ford & Pleasant, 1994; Teasdale, 1995). Weeds found in maize crop may be classified as broad leaves, grasses, and sedges. Mulching is the application of a covering layer of material to the soil surface. Many kinds of materials are used to some extent as mulch for controlling weeds and for other purposes. Various mulching materials have been utilized in agriculture both in field and home gardening. Some of these mulches are organic mulches as dust or soil, weeds or trash, crop residue or stubbles, straw, saw dust, and some are synthetic mulches such as paper, plastic, polyethylene and man made fiber materials (Shoemaker *et al.*, 1978).

Materials and Methods

The experiment entitled "Impact of different mulches on weed flora and yield of maize" was conducted at Agricultural Research Institute Tarnab, Peshawar during kharif season 2007. The experiment was laid out in Randomized Complete Block (RCB) design with four replications. Each replication comprised of eight treatments. Each treatment comprised of 4 rows with row to row distance of 75cm and each plot measured 5×3m². The detail of the treatments was as under.

- T1. Wheat straw
- T2. Saw dust
- T3. Polyethylene (white)
- T4. Polyethylene (black)
- T5. Newspaper
- T6. Primextra Gold 720SC @ 1.0 lit ha⁻¹
- T7. Hand weeding
- T8. Weedy check

The data were recorded on Number of kernels cob⁻¹, 100-kernel weight (g), Biological yield of maize (t ha⁻¹) and Grain yield (t ha⁻¹). Individual parameters were subjected to ANOVA technique and significant means were separated by LSD test.

Results and Discussion

Number of kernels cob⁻¹: Statistical analysis of the data revealed that number of kernels cob⁻¹ were non- significantly ($p \leq 0.05$) affected by different treatments (Table 1). It could be inferred from the data presented in Table 2 that maximum (456.45) kernels cob⁻¹ were recorded in Primextra Gold 720SC plots followed by polyethylene black (452.90) and hand weeded (451.45). The minimum (406.40) kernels cob⁻¹ were recorded in weedy check. The data in Table 2 further revealed that all the treatment produced almost same number of kernels cob⁻¹.

100-Kernel weight (g): Data on 100-kernel weight of different treatments is presented in Table 2. Statistical analysis of the data revealed that 100-kernel weight was non-significantly ($p \leq 0.05$) affected by different treatments (Table 1). Mean values shown in Table 2 revealed that maximum 100-kernel weight of 33.25 g was recorded in Primextra Gold 720SC plots. While the minimum (28.88 g) 100-kernel weight was recorded in weedy check. Similar results have been communicated by Khan *et al.*, (2002).

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Table 1 Mean squares for number of kernels cob⁻¹ and 100-kernel weight (g) as affected by different mulches in maize.

Source	D.F.	Number of kernels cob ⁻¹	100 kernel-weight (g)
Replications	3	1136.973	4.862
Treatments	7	1406.365	10.231
Error	21	1694.585	7.427
C.V (%)		9.47	8.80

Table 2. Number of kernels cob⁻¹ and 100-kernel weight (g) as affected by different mulches in maize.

Treatments	Number of kernels cob ⁻¹	100 kernel-weight (g)
Wheat straw	416.25	29.50
Saw dust	419.95	29.75
Polyethylene (white)	438.70	31.25
Polyethylene (black)	452.90	32.88
Newspaper	435.90	30.38
Primextra Gold 720SC	456.45	33.25
Hand weeding	451.45	31.75
Weedy check	406.40	28.88
LSD value at 5%	NS	NS

NS = Non-significant

Table 3. Mean squares for biological yield and grain yield (t ha⁻¹) as affected by different mulches in maize.

Source	D.F.	Biological yield (t ha ⁻¹)	Grain yield (t ha ⁻¹)
Replications	3	0.033	0.014
Treatments	7	10.633**	1.003**
Error	21	0.212	0.026
C.V (%)		5.53	7.91

** = Significant at 5% level of probability

Table 4. Biological yield and grain yield (t ha⁻¹) as affected by different mulches in maize.

Treatments	Biological yield (t ha ⁻¹)	Grain yield (t ha ⁻¹)
Wheat straw	6.71 e	1.68 e *
Saw dust	7.40 d	1.78 de
Polyethylene (white)	8.71 c	2.03 c
Polyethylene (black)	9.66 b	2.48 b
Newspaper	8.32 c	1.93 cd
Primextra gold 720SC	10.95 a	2.98 a
Hand weeding	8.98 c	2.06 c
Weedy check	5.90 f	1.36 f
LSD value at 5%	0.6771	0.2371

* Means followed by different letters in the respective column are significantly different by LSD test at 5% probability level

Biological yield (t ha⁻¹): Table 3 shows that biological yield of maize was significantly ($p \leq 0.05$) affected by different treatments. Higher biological yield of 10.95 t ha⁻¹ was obtained from Primextra Gold 720SC plots. The lowest (5.90 t ha⁻¹) biological yield was recorded in weedy check plots. The maximum biological yield was obtained from Primextra Gold 720SC plot and minimum biological yield was obtained from weedy check plots. As leaf area, number of leaves plant⁻¹, plant height, ear length, diameter and number of grains contribute in increasing the biological yield, the results reported by Easson and Fearnough (2000) are in analogy with our results.

Grain yield (t ha⁻¹): Data regarding grain yield are presented in Table 4. Statistical analysis of the data revealed that grain yield was significantly ($p \leq 0.05$) affected by different treatments (Table 3). It could be inferred from the data presented in Table-12 that maximum (2.98 and 2.48 t ha⁻¹) grain yield was recorded in Primextra Gold 720SC plots and polyethylene (black). While the minimum (1.36 t ha⁻¹) grain yield was recorded in weedy check plots. This might be due to effective weed control by Primextra Gold 720SC and polyethylene (black) mulch. Our results are in line with those reported by Nyakatawa (1997) and Pramanik (1999).

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(Received for publication 5 January 2010)