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WEED CONTROL IN PEA *(Pisum sativum* L.*)* THROUGH MULCHING

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ABSTRACT

An experiment was conducted at Agricultural Research Farm, NWFP Agricultural University, Peshawar to study the effect of different mulches for controlling weeds in edible pea (Pisum sativum L.). The treatments comprised of 5 mulches: white polyethylene, black polyethylene, wheat straw, newspaper, and saw dust as well as hand weeding and a weedy check. Variety 'Climax' was planted on a plot size of 5 x 1.6 m^2 using randomized complete block (RCB) design, having three replications during the last week of October 2007. The data were recorded on weed density (m^{-2}) two weeks after treatment at first picking, days to 50% pods formation, number of pods $plant^{-1}$, number of seeds pod^{-1}, pod yield (kg ha^{-1}). All the parameter except plant height was significantly affected by different treatments. Hand weeding and newspapers produced better results as compared to the other treatments. Maximum number of pods $plant^{-1}$ (50.87, 48.40), number of seed pod^{-1} (5.83, 5.80) and pod yield (2707, 2613 and 2512 kg ha^{-1}) were recorded in hand weeding, newspaper and polyethylene black treatments, respectively, whereas minimum values in these parameters were recorded in weedy check. All mulches were effective and produced better results as compared to weedy check, but due to their better performance newspapers and polyethylene (black) are recommended for the environment friendly and sustainable control of weeds and realizing better yields of edible pea.

Keywords: Pea, mulches, weed management, non-chemical control.

INTRODUCTION

Pea (*Pisum sativum* L.*)* belongs to the family *Leguminosae,* is a well-known vegetable of the temperate regions. It is annual in habit and self pollinated, and this herbaceous plant is the major food ingredient of vegetarian diets and meets the dietary requirements of the people throughout the world. It also contains most of the essential nutrients like fibre and protein (Khan and Shakoor,, 1991). Pea seeds consist of two large cotyledons. It is a cool season crop therefore, confined to cool temperate zones. There exists a lot of variation in pea cultivars for

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different plant characteristics like height, maturity, yield, color and quality of fruit etc. Cultivars also vary in the adaptability to certain agro-climatic conditions. So it is possible to have a cultivar of better attributes through hybridization.

The total area under cultivation of peas during 2006 in North West Frontier Province was 1.1 thousand hectares, while in Pakistan 90.3 thousand hectare. During the same year the production of peas in NWFP was 0.7 thousand tons and in Pakistan 52.4 thousand tons. The yield matter ha^{-1} in kg was 636 in NWFP and 580 in Pakistan in (MINFALL, 2007). To increase per hectare yield of pea sustainable weed control methods should be kept in mind and also to fulfill the WTO regimes non-chemical weed control should be kept into focus to meet the international market needs. Cultural weed management largely involves manipulating farming practices to suppress weed growth and production, while promoting the development of the desired plant. Well recognized aspects of cultural control include preventing the spread of weeds between fields or sites, rotating crops and pastures, encouraging the competitiveness of desired species, soil solarization, timed planting and harvest.

Other cultural control methods include the use of mulches, cover crops and inter-cropping (Lemerle and Murphy, 2000). Weed management is a key issue in organic farming systems (Bond and Grundy, 2000). Because the spectrum of available direct weed control options is restricted and herbicides play a minor role (Verschwele and Niemann, 2005), organic weed control is mainly based on preventive cultural measures. Weed management aims at manipulating the competitive equilibrium in favour of the crop and to keep undesired weed growth at manageable levels, rather than to totally eradicate weeds (Bond and Grundy, 2000). A number of reviews of developments in non-chemical weed control techniques and systems have been made (Parish, 1990) and some aspects of weed control in organic farming systems have been appraised (Stopes and Millington, 1991). A wider range of weed control options is becoming available to organic growers as new techniques are developed, and established methods are improved.

Keeping in view the importance of cultural weed control practices in pea an experiment was conducted with the following objectives:

1. To study the effect of different mulches for controlling weeds in pea.
2. To find out the most suitable and economical mulch for weed control in pea.

3. To figure out the effect of various mulches on the yield and yield components of pea.

MATERIALS AND METHODS

To study the effect of various mulches on yield and yield components of pea, an experiment was conducted at Agricultural Research Farm, NWFP Agricultural University, Peshawar, Pakistan during winter 2007-08. The experiment was laid out in randomized completed block design with three replications. Each replication comprised of seven treatments. DAP fertilizer at standard rate was used during seed bed preparation. The detail of treatments is as follows:

T1. Polyethylene (black)
T2. Polyethylene (white)
T3. Newspaper
T4. Saw dust 1 kg m^{-2}
T5. Wheat straw 1.5 kg m^{-2}
T6. Hand weeding
T7. Weedy check

During the course of studies the data were recorded on Weed density (m^{-2}) two weeks after treatment and at the time first picking, Days to 50% pods formation, number of pods $plant^{-1}$, number of seeds pod^{-1} and pod yield (kg ha^{-1}).

The data for each parameter were subjected to analysis of variance technique and the means were separated by LSD test (Steel and Torrie, 1984).

RESULTS AND DISCUSSION

Weed density (m^{-2}) two weeks after treatment

Statistical analysis of the data revealed that weed density m^{-2} was significantly affected by different treatments (Table-1). The data depicted that maximum (40.33) weed density (m^{-2}) was recorded in the weedy check, while the minimum (9.33) and 13.33) weed density (m^{-2}) was recorded in hand weeding and newspaper, respectively. All the remaining treatments produced statistically similar results. The difference in weed population in different treatments can be attributed to the fact that some mulches were more effective for weed control than the others. Our results are in line with those reported by Monks *et al.* (1997) who concluded that hand weeding and some mulches provided satisfactory weed control.

Weed density (m^{-2}) at first picking

Weed densities at first picking were significantly affected by different mulches (Table-1). The data in Table-1 exhibited that maximum (33.0) weeds m^{-2} were recorded in weedy check, however, it was statistically at par with wheat straw; saw dust and polyethylene (white) (27.67, 26.67 and 26.67), respectively. The minimum (10.33) weeds m^{-2} were recorded for polyethylene (white). These results showed that some mulches like newspaper, hand weeding and polyethylene (black) controlled the weeds significantly as compared to weedy check and rest of the mulches. The results are in a great conformity with the results of Gurcharan *et al.* (1994) who stated that all weed control treatments including hand weeding, resulted in significant weed control as compared to weedy check.

Days to 50 % pods formation

Days to 50% pods formation were significantly affected by various treatments (Table-1). The statistical analysis of the data depicted that maximum number of days to 50% pod formation (99.33) was observed for polyethylene (black). However, it was statistically at par with polyethylene (white), wheat straw, hand weeding and weedy check. Minimum number of days (93.33 and 94.0) was observed in sawdust and newspaper. However, it was statistically similar with polyethylene (white), wheat straw, hand weeding and weedy check. These results indicated that over all effects of various mulches on days to 50% pods formation were similar with the only exception of newspaper and saw dust.

Table-1. Weed density (m^{-2}) 2 wk. after treatment and at first picking, as affected by different mulches in pea *(Pisum sativum)*.

Treatments	Weed density (m^{-2}) WAT†	Weed density (m^{-2})at first picking	Days to 50% pod formation
Polyethylene (white)	18.67d	18.33bc	99.33a
Polyethylene (black)	20.00cd	26.67ab	96.00ab
Newspaper	13.33e	10.33c	94.00b
Saw dust	27.33b	26.67ab	93.33b
Wheat straw	23.67bc	27.67ab	96.00ab
Hand weeding	9.33e	14.00c	97.33ab
Weedy check	40.33a	33.00a	95.00ab
$LSD_{0.05}$	6.071	11.32	5.25

†WAT= Weeks after treatments

Number of pods $plant^{-1}$

Number of pods $plant^{-1}$ were also significantly affected by mulches (Table-2). Data in Table-2 showed that maximum (50.87 and 48.40) pods $plant^{-1}$ were observed in hand weeding and newspaper treatments, whereas minimum 30.03 pods $plant^{-1}$ were observed in weedy check and was statistically at par with polyethylene (white) (35.87), polyethylene (black) (35.87), saw dust (36.53) and wheat straw (31.13). The greater number of pods $plant^{-1}$ in hand weeding and newspaper treatments were

due to good weed management by these treatments as compared to rest of the treatments. The results of James *et al*. (2006) also supported our findings that stated that mulches were more effective in controlling weed as compare to the treatment of herbicides.

Number of seeds pod^{-1}

Number of seeds pod^{-1} were also significantly affected by various mulches (Table-2). The data indicated that maximum (5.83) seeds pods^{-1} were recorded in hand weeding. However, it was statistically similar with newspaper and sawdust (5.8) and (5.5), respectively. Minimum (4.26) seeds pods^{-1} were observed in weedy check plots. It was statistically at par with rest of the treatments. The maximum seeds pods^{-1} were due to the fact that plants allocated maximum resources of nutrients to the crop due to no competition in hand weeding treatment and the maximum inhibition of weed growth by newspaper. Consequently these treatments performed well in the yield components. These results are in conformity to the findings of James *et al* ,(2006) who reported that maximum number of seeds pods^{-1} were recorded in plots where weeds were controlled.

Pod yield (kg ha^{-1})

Analysis of variance of the data revealed that pod yield was significantly affected by different mulches (Table-2). The data depicted that maximum 2704 kg ha^{-1} yield was observed in hand weeding. However, it was statistically at par with newspaper and polyethylene (black) (2613 and 2512 kg ha^{-1}) mulches minimum 1610 kg ha^{-1} pea yield was recorded in weedy check however, it was statistically similar with polyethylene (white), sawdust and wheat straw (1784, 1920 and 1702 kg ha^{-1}) respectively. Maximum yield in hand weeding was due to the no weed competition with pea crop in field and in mulches like newspaper and polyethylene (black) were due to better suppression of weeds in these treatments. The reasons for low yield in some of the mulches may be due to its ineffective weed control by these mulches. Our results are in line with those reported by Greer and Dole (2003), Makus *et al.* (1994) and Olabode *et al*. (2007). These results are also in conformity with that of Townley and Wright (1994) who stated that good weed control is critical for attaining high pea crop yield.

Table-2. Number of Pods plant^{-1}, number of seeds pod^{-1} and pod yield kg ha^{-1} as affected by different mulches in pea *(Pisum sativum)*.

Treatments	Number of pods plant^{-1}	Number of seeds pod^{-1}	Pod yield (kg ha^{-1})
Polyethylene (black)	35.87b	4.33b	2512a
Polyethylene (white)	35.87b	4.36b	1784b
Newspaper	48.40a	5.80a	2613a
Saw dust	36.53b	5.50a	1920b
Wheat straw	31.63b	4.46b	1702b
Hand weeding	50.87a	5.83a	2704a
Weedy check	30.03b	4.26b	1610b
LSD value at 5%	6.65	0.505	375.98

CONCLUSIONS AND RECOMMENDATIONS

Some mulches were more efficient in controlling weeds in pea (*Pisum sativum* L.) than the others. Among mulches, polyethylene (black) and newspaper produced better results than wheat straw, saw dust, and white polyethylene. Therefore newspapers and polyethylene (black) are recommended for the environment friendly and sustainable control of weeds and realizing good yields of edible pea.

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