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EFFECTS OF SOWING DATES AND DIFFERENT MULCHES ON WEIGHT OF WEED AND YIELD IN *CUCURBITA PEPO* VAR. STYRIACA IN SANANDAJ

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Abstract

In order to investigate the effect of planting date and different management methods on weed weight changes and pumpkin (*Cucurbita pepo* L.) yield, a split plot experiment was arranged in a randomized complete block design with three replications. Experiments were carried out in a field experiment at the Gerizeh station, Agricultural and Natural Resources Research Center of Kurdistan Province, Sanandaj, Iran for two consecutive years. The experimental treatments included three planting dates of 10 May, 20 May and 31 May as main plots and different weed management treatments, including black polyethylene, blue sack, white sack, white yarn, white textile, black textile, straw mulch with a thickness of at least 7 cm, hand weeding (positive control), and plot without weeding (negative control) as sub plots. The results of this study showed that during the entire growth period, 31 May was the best planting date for pumpkin to reduce 58% and 84% fresh and dry weight of weeds in the climatic conditions of Sanandaj. Blue mulch and black cloth also caused the highest weed loss at the end of the growth period. Black polyethylene mulch and blue sanguine produced the maximum weight of 1000 grains (146.6 g), pumpkin fruit (35696 kg/h) and seed weight of pumpkin (675 kg.h) in field conditions. According to the results of this study, mulching of blue sack was more appropriate than other treatments on the 31 May planting date.

Keywords: pumpkin, weed, mulch, *Cucurbita pepo.*

Introduction

Chemical drugs have many side affects (Albalawi). Currently, because of the side effects of chemical drugs, the use of herbal medicines is increasing (Arifin *et al*., 2019). According to the World Health Organization, 80% of people in different countries use herbal medicines to treat illnesses (Ekor, 2014; Benzineb *et al*., 2019). Pumpkin skin is cultivated in many areas of America, Europe and Australia for various uses, including the pharmaceutical industry, oil extraction, and grasshopper consumption. In recent years, this plant has entered the flora of Iran, and its cultivation has been developing in different regions, and has been considered as an important source of medicine in the last decade and has a good economic value (Siami *et al*., 2003).

One of the primary work on the compatibility and cropping of medicinal plants is to determine the appropriate planting date for these plants (Mosavi *et al.*, 2011). And the parameters that affect the yield and quality of pumpkin seeds are sowing dates (Murkovica *et al*., 2004). Because it affects the phenological development, the relationship between source and destination, and the allocation of photosynthetic materials to different parts of the plant (Khalil *et al.,* 2010). And the best seed gum yield in the Takestan region is related to planting dates of 5 May and 20 May, respectively.

Weeds can reduce crop yields, especially if they are not controlled early in the growing season, the damage to the main crop is greater (Molinar *et al*., 2014). In order to produce a healthy product and organic product, it is recommended that the weed management in the fields be replaced with herbicide alternatives. In order to produce a healthy and organic product, it is recommended that herbicide alternatives be applied to weeds management in fields that include the use of biological agents, cultivars with high competition ability, cover crops, mulch, solarization, seeds and allelopathies. (Moradi *et al*., 2008). The use of integrated management methods for control of weeds in pumpkin fields is necessary because the number of registered selective herbicides affecting weed of this product are limited. In this regard, the use of mulch as an alternative and applied method can be considered. And the research done in the field of pumpkin (Walters *et al*., 2008) can be noted.

Regarding the importance of pumpkin in the production of herbal medicines, and the need to reduce the use of chemical pesticides in the production and processing of these materials, use of healthy environmental techniques such as the use of mulches, in order to achieve the best mulch to reduce the direct and indirect damage caused by weeds, and the optimal yield of the product, and determine the best planting date in different regions, to increase the competitive ability of pumpkin skin with weeds and create the optimum conditions for the growth and development of the product, it seems necessary to research in this field. Therefore, with respect to research vacuum, a study is conducted on choosing the best planting time for pumpkin seeds in Sanandaj and selecting and choosing the best type of cover mulch to control the existing prevalent weeds on the fields of this medicinal plant.

Materials and Methods

In order to investigate the effect of planting date and types of mulch on the yield of pumpkin and also the selection of the best mulch for controlling pumpkin weeds, an experiment was conducted at the Research Station of Kurdistan Province Agricultural and Natural Resources Research Center of Sanandaj (With cold and semi-arid weather conditions with a temperature range of 25.2 - 1.6 degrees Celsius and an average annual rainfall of 497.3 - 61 mm and a height of 1480 meters above sea level) as split plot in a randomized complete block design.

The experiments was carried out in three sowing dates of 10 days from each other (10 and 20 May and 31 May), using nine weed management treatments including black polyethylene, blue sack, white yarn, white sack, white textile, black textile, and straw mulch with a thickness of at least 7 centimeters, manual weeding (positive control) and plot without weeding (negative control). The main plot consisted of three planting dates and subplots including nine weed management treatments.

Each sub plot consisted of three planting rows (in the form of furrow with furrow bank intervals of 100 cm, furrow bank width of 70 cm, and list width of 30 cm). Cultivation was carried out with hand and in mound planting method (three seeds per hole) in the middle of the furrow with a depth of 4 cm and a distance of 40 cm on the rows.

In this experiment, each row of planting contained 8 plants. Different treatments were applied to 5 plants and 3 plants remained untreated**.** And the data from untreated plants was used as an intraplot control. The field was irrigated using drip irrigation. Weed sampling was carried out in two stages of early and late growing season of pumpkin. SAS ver 9.2 software was used to analyze the collected data. In this regard, ata normalization, data analysis, and variance analysis were used by LSD test at a probability level of 5%.

Results and Discussion

Based on data analysis, the results of this study showed that in both consecutive years of testing, application of planting date treatments and different types of management methods were affected by fresh and dry weight of weeds both during the first and late stages of growth ($P < 0.05$) (Table 1). Also, weight of 1000 grains was significantly affected by planting date and different types of weed management methods (Table 1). In other words, the interaction of applied treatments (sowing date - management) on the traits studied in this experiment was significantly effective.

Effect of treatments on weight of weed during growth period in pumpkin field

Based on the results, it was observed that during the first period of growth, the second planting date, 20 May, for the weeds was the most suitable treatment. Because the highest amount of weed's weight (fresh and dry) was observed on this date (1592 – 717 g/m^2, respectively). However, the lowest weight of weeds (fresh and dry) was observed on the third date, 31 May. In fact, by applying straw mulch, in the third planting date, fresh (196 g/m^2) and dry (124 g/m^2) weight of weeds decreased in the first period of growth by 63% and 65%, respectively.

Also, based on the results, at the end of the growth period, the best planting date for fresh (173 g/m^2) and dry (85 g/m^2) loss of weeds weight, on 31 May; Blue sack and black textile, respectively, were the best weed management.

However, the highest fresh and dry weight of weeds (558 g/m^2 - 423 g /m^2, respectively) were observed on 10 May along with mulch straw and 31 May, with non-control of weeds. In other words, due to the application of planting date and weed management, the fresh and dry weeds weight of the pumpkin field fell by 58% and 84% respectively (Table 1).

Table 1: Analysis of variance and mean of planting date and weed management with effective standard deviation on weeds weight and weight of 1000 grains of pumpkin.

Date	Mulch	Square of weed's weight				Weight		
		first stage		end stage		1000 Grain(g)	Square of Fruit (kg.h)	Seeds (kg.h)
		Fresh (g.m^2)	dry(g.m^2)	Fresh (g.m^2)	dry(g.m^2)			
20.2	Straw	37.21±3.2	21.83±2.6	31.45±6.6	36.85±8.9	120±0.0001	118.02±14.8	15.26±12
	blue sack	27.21±7.3	14.54±2.9	18.41±1.3	24.55±3.8	120±40	146.73±101	22.58±1
	white yarn	38.9±0.07	21.72±3.7	22.60±7.3	32.27±6.1	100±20	57.81±27.5	9.16±3.2
	positive control	3.16±0.01	3.16±0.001	3.16±0.001	3.98±0.001	83±64	120.88±6.2	14.7423±0.7
	black textile	22.89±10.9	13.13±5.4	21.77±7.9	18.77±16.4	120±20	95.43±37.2	13.77±5.8
	white sack	39.61±0.4	22.81±1.5	29.80±11.7	35.55±13.9	126.6±23	66.89±33.6	10.83±5.7
	black poly ethylene	15.88±11.3	11.50±7.4	17.72±1.8	23.83±1.1	146.6±11.5	108.9±80.6	16.47±7.6
	negative control	38.99±1.5	22.86±2.3	30.82±10.1	24.84±20.4	9±0.0001	3.31±0.0001	3.3±0.0001
	white textile	39.84±0.2	22.17±1.2	16.39±11.9	23.59±17.4	53±45.5	50.3±6	12.09±7
30.2	Straw	35.65±6.3	21.31±3.7	23.63±6.5	33.33±13.6	100±20	35.9±5.3	6.04±0.4
	blue sack	25.08±8.3	14.07±5.4	18.05±1.9	16.77±12.1	120±20	74.37±52.9	10.43±5
	white yarn	34.21±	22.83±4.8	19.54±15	22.82±16.3	53±45.5	29.87±24.1	5.53±2.1
	positive control	3.16±0.01	3.16±0.001	3.16±0.001	3.98±0.001	100±0.001	60.44±51.7	7.07±3.5
	black textile	31.65±4.5	19.22±4.14.	25.78±3.60	35.64±4	120±20	86.64±11.4	12.38±0.2
	white sack	39.43±0.4	24.33±3.7	30.90±7.4	38.55±8.8	110±10	60.77±6.5	9.02±0.6
	black poly ethylene	26.08±19.8	16.21±11.3	17.73±16.3	26.43±23.4	110±10	52.53±44.6	8.50±4.8

	negative control	39.28±0.3	26.78±5.9	18.55±13.4	38.41±6.1	9±0.001	3.31±0.0001	3.3±0.0001
	white textile	39.96±0.1	23.68±0.5	29.63±4.8	37.89±4.2	96.3±78.2	65.12±61	9.27±0.6
10.3	Straw	14.61±12.2	9.20±5.7	13.87±1.7	17.57±3.1	120±0.001	81.25±28	11.16±4.8
	blue sack	21.90±4.5	13.21±1.7	12.99±8.6	24.47±0.6	120±20	188.26±19.8	24.2±0.4
	white yarn	38.74±1.1	22.05±1.2	24.81±7.7	21.24±18.5	39.3±52.5	9.55±10.7	4.4±1.8
	positive control	3.16±0.001	3.16±0.001	3.16±0.001	3.98±0.001	90±10	116.58±60.1	13.27±5.8
	black textile	3.16±0.001	3.16±0.001	14.18±1.8	6.33±4	130±10	101.3±13	13.87±1.5
	white sack	38.52±2	21.76±2.9	24.93±2.5	38.09±3.4	73±65.5	113.14±99.3	14.66±10
	black poly ethylene	18.78±15.5	11.24±8.2	16.74±3	21.95±7.5	130±10	113.78±1.1	16.26±2.5
	negative control	38.91±0.8	22.91±0.05	31.06±2.1	41.40±4.2	9±0.0001	3.31±0.0001	3.3±0.0001
	white textile	37.08±1.9	22.31±2.1	26.57±2.2	34.80±9.7	53±45.5	62.98±54	7.88±4.2

Table 2: Analysis of variance

Analysis of variance							
Year	**	**	NS	NS	**	**	**
Block(Year)	**	NS	NS	NS	*	**	**
Date	**	*	NS	NS	NS	**	**
Year*Date	**	**	NS	NS	NS	**	**
Treat	**	**	**	**	**	**	**
Year*Treat	**	**	**	**	**	NS	**
Date*Treat	NS	NS	NS	NS	NS	NS	NS
Year*Date*Treat	NS	NS	NS	NS	NS	NS	NS

ns, *, and **, respectively, are unreasonable and meaningful at the probability level of 5% and 1%, based on the LSD test

The effect of treatments on the pumpkin yield

The results of this experiment showed that weight of 1000 grains was significantly affected by various treatments (Table 1). In weed control (control) weight of 1000 grains was 83 grams. While on the 10 May and the black polyethylene mulch, that weight of 1000 grains (146.6 g) increased by 76% compared to the control treatment. But decreased by 89% as a result of weed control (g 9) (Fig. 1). In fact, based on what was expected, the lowest weight of 1000 grains was observed in the negative control treatment, namely non-control of weed (Fig. 1). According to other researchers, the weight of 1000 grains is influenced by different cover mulches. Ghanbari *et al.* (2007) Reported increasing the number of seeds per pumpkin fruit by increasing the moisture content of the plant in different ways. One of the important benefits of using a mulch coating on various products is to prevent water loss and increase water efficiency to the best possible state. It is expected that with the increase in the number of pumpkin fruits in mixed cropping, along with the use of mulch, the yield of pumpkin fruit will also increase. Increasing the number of fruits is one of the important factors in increasing the yield of pumpkin (Ortek *et al.*, 2004). Due to the fact that the development of pumpkin yield is carried out in hot summer days, so the moisture content available to grow this valuable medicinal plant is very important. Therefore, it seems that the use of mulch improves the moisture content of the plant, and ultimately increases the number of fruits in the plant. (Al-Imran *et al.*, 2005) reported an increase in the number of pumpkin fruits with increasing moisture content available.

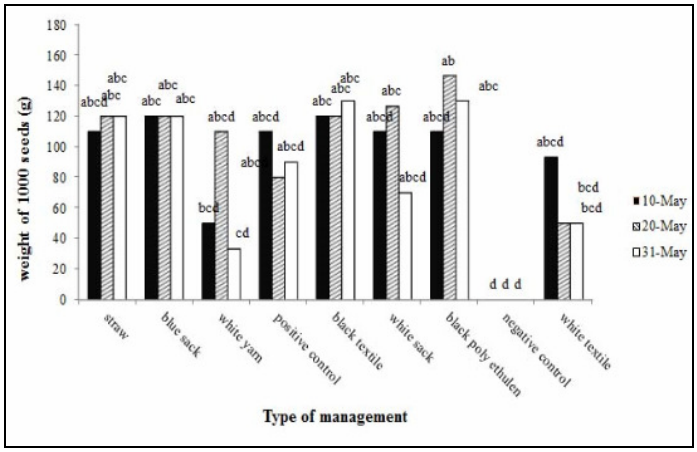

Fig. 1 : Effect of planting date - Weed management on weight of 1000 seeds in field conditions.

Also, pumpkin fruit weight was significantly affected by application of planting and weed management at 5% level ($P < 0.05$) (Table 1). fruit weight in weed control (positive control-control) (15996 kg /h) in sowing date of 31 May, and blue sack mulch in the sowing date of 31 May obtained the maximum pumpkin fruit weight

(35696 kg/h). Thus, by comparing the use of blue sack in comparison with weed control (positive control), the fruit weight was increased by 61% (Table 1 and Fig. 2); But compared with non-control of weed (3.3 kg/h), it was about 97% lower in production (Table 1 and Fig. 2).

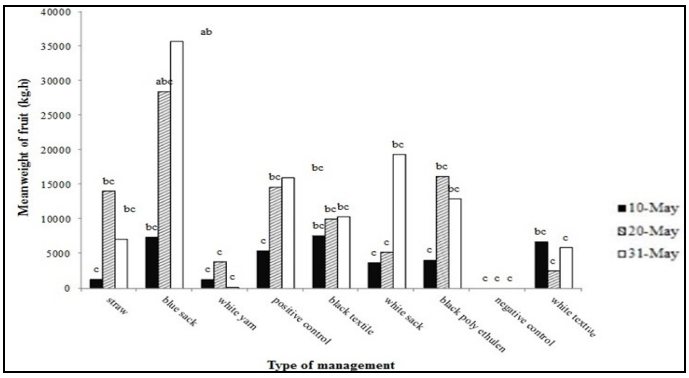

Fig. 2 : Effect of planting date - Weed management on the weight of pumpkin fruit in field conditions.

It seems that the application of blue sack mulch on the third sowing date (31 May) significantly increases the production and yield of pumpkin product. Because in addition to two traits weight of 1000 grains and fruit weight, the amount of pumpkin seeds in this treatment also reached its maximum (675 kg/h), which was increased by 86% in comparison with the control treatment (non- control of weed) (Table 1 and Fig. 3).

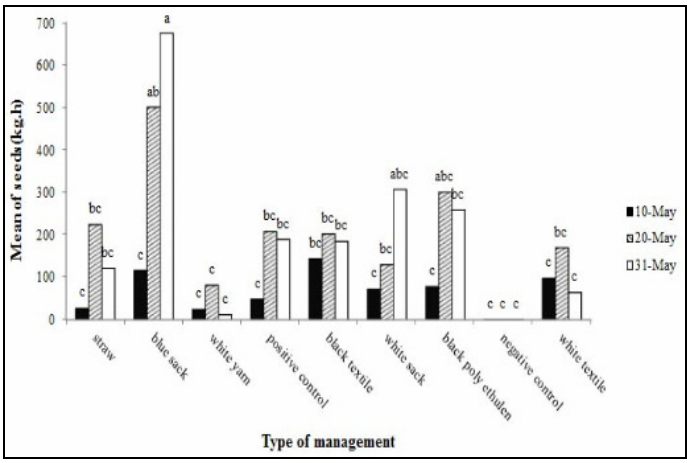

Fig. 3 : Effect of planting date - Weed management on the weight of pumpkin seeds in field conditions. *The numbers with common letters in each column have a significant difference (P <0.05) based on the LESD test. Numbers followed by the same letter are not significantly differentns (P<0.05).

Therefore, in terms of reducing weeds weight (fresh and dry weight) and in terms of increasing the yield and yield of pumpkin based on weight of 1000 grains, fruit weight and grain weight (kg/ha), in the geographical coordinates of the present study, on 31 May, Optimum planting date of pumpkin was diagnosed. This issue varies based on a number of different things.

Generally, however, planting date will affect the plant's cumulative temperature, rainfall, and optical periods, which will affect the plant's vegetative and reproductive stages, and generally change the parameters of the meteorological conditions, and will change the yield and quality of the produced product (Safari *et al*., 2010).

Arvey *et al*. (2001) reported that planting dates are effective on the yield of pumpkin fruit. In their experiment, the highest fruit yield was obtained on 20 May and the lowest was obtained on 19 June in Mashhad. Ortek *et al.* (2004) reported an increase in the number of pumpkin fruits with increasing moisture content. In terms of management and type of mulch, the results on weeds and crops were slightly variable and different. Based on the minimum weight of weeds, straw mulch and black polyethylene can be considered as the best mulch in the first period of growth, in order to reduce weed fresh and dry weight of weeds. Also, in the end of the growth period, the mulch of blue sack and black textile, respectively, caused the most fresh and dry weight loss of weed (Table 1). Black polyethylene and blue sack produced the highest yield of pumpkin in field conditions. In general, it can be said that the blue sack can be more appropriate among other mulches. In the results of some researchers, since the black plastic mulch does not pass sunlight, it has been more successful in weed control than other plastic mulches; Because it has reduced about 64% to 98% of weeds growth during the growth period (Egley, 1983). In semi-humid regions, however, mulch is generally used to increase moisture content in the root zone of plants (Scopel *et al*., 2004). And the use of mulch reduces evaporation from the soil surface and increases the moisture content available to plants (Burma *et al.*, 2011).

Also, the cultivation systems and application of mulch have a significant effect on the number of pumpkin fruits per hectare. So that the delayed mixing systems of rainbow chickpea - pumpkin, respectively, improved 27% and 20% of the number of fruits, which only the above-mentioned culture system showed a significant difference with the pure culture of pumpkin (Mumman, 2013). One study reported that the highest and lowest number of pumpkin fruits were obtained at 11083 and 7750 fruit/ha, respectively, in the mulch and no mulch system.

Also, the interaction between the planting system and the use of mulch resulted in an increase of 43% and 38% of the fruit, respectively, in the system with mulch and the system without mulch, compared to pure cultivation without the use of mulch (Mumman, 2013). The type of mulch is also a very important issue, and this issue has been reported in various ways in various ways. For example, in planting pumpkin seeds, often, plastic mulch is used to warm the soil and control the weeds. And it is better to use other mulches less (Molinar *et al*., 2014). Because Marsels (1997) reported that with increasing nitrogen fertilizer from zero to 200 kg per hectare, the average fresh weight of fruit, weight of 1000 grains, fruit yield and seed yield per hectare of this plant increased significantly. As the level of fertilizer increases with increasing light intensity, access to photosynthetic materials increases and as a result, the number and size of pumpkin fruit cells increases. Based on this argument, mulch use reduces the access to photosynthetic light and materials, and thus does not improve the yield of pumpkin.

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