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Response of Leek Variety (Hybrid F1/Carentan) Yield to Different Mulch Materials and Weeding-Frequency at Ambe Kebele Wolaita Zone

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Abstract

This experiment was carried out for two consecutive growing seasons (2012 and 2013) at the Boloso Bombe model in farmer land, Ambe Kebele, to investigate the response of leek variety (Hybrid F1) yield to different mulch materials and weeding-frequency. A split plot experiment was laid out in a randomized complete block design (RCBD) with three replications to randomize the weeding-frequency levels and mulch materials in the main and sub-plots, respectively. The experiment comprised of two weeding-frequency levels, i.e. weeding-frequency (WF) and no-weeding (NWF) and six mulch materials, i.e. black polyethylene, white polyethylene, maize straw, palm fronts, grasses and no mulch. The parameters taken on soil physical and chemical properties are soil moisture content (%), soil temperature (^{O}C), soil pH, total nitrogen, available phosphorus and soil organic matter. Growth and yield parameters taken are as follows: average plant height, number of leaves, and number of leek pseudo stem, stem girth, number of shaft(white part) per plant, shaft(white part) length, shaft(white part) diameter and yield per land area. Weeds were identified and their dry weights were measured. Data were collected from ten randomly selected plants in each plot. The data were statistically analysed using SAS. The analysis of variance (ANOVA) was performed to find out the significance of variation among the treatments while the significant difference between mean treatments were separated using Duncan's multiple range test at 5% level of probability. The result obtained from this study indicated that mulch materials and strong weeding-frequency affect significantly growth parameters of leek, yield per plant and yield per land area. The result also, indicated that plot mulch with black polythene performance best in terms of growth and yield and also improved soil physical properties better than either white polythene or organic mulch in the study area. It is therefore recommended that black polyethylene should be used as mulch materials for leek production. However, better and stable shaft (white part) yield of leek could be obtained with the practice of mulching in combination with weeding-frequency frequency. It is recommended that mulching should be carried out together with weeding-frequency for higher shaft (white part) yield and black polyethylene should be use as mulch material in the study area.

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Leek, Mulch Material, Weeding frequency, Growth, Yield, Soil and organic.

Introduction

Leeks (*Allium porrum* L.) are members of the onion family, closely related to the onion, garlic, shallots, and chives. (Cholakov, 2009). It originated in Middle Asia, with secondary centers of development and distribution in Western Asia and the Mediterranean countries. The leek has been cultivated in Western Europe since the

middle ages and found its way to North America with early settlers from Europe. It is a more popular vegetable in Europe than in North America, but potential exists in Ontario for the replacement of imports from the United States and market expansion by increased domestic consumption as consumers' eating habits become more varied Karic *et al.,* 2005; (www. Accessibility leek/Active Offer, 2021)

Leek (*Allium var. Porrum* L) is the most important and popular vegetable crop grown commercially throughout the country. In spite of its wide cultivation in Ethiopia, the average yield is still very low (Karic *et al.,* 2005).

The members of the Allium genus are rich in various bioactive constituents including flavonoids, sulphuric compounds, and saponins with a variety of biological activities including antimicrobial, antihypertensive, anti-hyperlipidemic, antidiabetic, anti-atherosclerotic and anti-carcinogenic effects. It is believed to have anti-hepatotoxic and antifungal activities (Rahman *et al.*, 2006). Allium species are considered rich sources of secondary metabolites, including phenolic acids and their derivatives, flavonoids (flavan, flavanone, flavones, flavonol, dihydroflavonol, flavan-3-ol, flavan-4-ol and flavan- 3,4-diol) and flavonoid polymers (proanthocyanidins or condensed tannins) which have significant health benefits (Fattorusso *et al.,* 2001). It has been reported demonstrated that kaempferol is the main flavonoid aglycone in leek

In Wolaita zone has different agro-ecology, inadequate soil moisture is the main hindrance for leek production in the dry season. Use of mulches offer great hope because of its moisture conserving ability and also, its moderate soil temperature (Evans *et al.,* 2003; Knezevic *et al.,* 2003). Polyethylene mulches are widely used in vegetable production and have contributed significantly to reduction of losses due to weed competition (Uguajio and Ernest, 2004). Film color may affect effective weed seed germination, growth, and development under plastic (Brault *et al.,* 2002). Black polyethylene plastic mulch is the standard plastic mulch used in vegetable production (Gordon *et al.,* 2010).

Researchers using black plastic instead of bare soil have recorded higher yields (Mirshekari *et al.,* 2012); Ragablarigani and Aghaalikhani, (2011), earlier harvests Ihara *et al.,* (2010), (Amador–Ramirez, 2002; Bukun, 2004) have also reported the moisture-conserving property of polyethylene mulches. The ability of organic mulch to conserve soil moisture was appreciably lower than that of the polyethylene mulch(Evans *et al.,* 2003) and Results of the experiments showed that the yield of leek declined with increasing duration of weed presence and this response was in agreement with previous findings reported on other crops (Amador–Ramirez, 2002). The natural mulching (paddy-straw or sugarcane trash) also stimulated vegetative growth compared to un-mulched but to a lesser extent than polyethylene mulch. Different mulch materials influenced leave width, pseudo stem length and shaft (white part) in leek (Tursun *et al.*, 2004).

The natural mulching materials such as paddy-straw or sugarcane trash retarded the weed growth considerably compared to control (Buckelew *et al.*, 2006). Weeding-frequency competes with the crop for nutrients, water, sunlight and space. They also harbour pathogens. Leeks are poor competitors with weeds and therefore the garden should be kept weed free in order to avoid the losses attributed to weed infestation (Hanelt and Mansfeld, 2001).

Weeding frequency is a means of providing support to ensure a clean and unblemished leek pseudo stem which kept the leek pseudo stem off from the ground, minimizing diseases and rotting of the leek pseudo stem thereby increasing marketable yield (Karic *et al,* 2005). Mark –stable yield of leek under wet conditions was significantly increased by weeding-frequency-frequency of leek plants (Baumann, 2000). Therefore the objective of the study was to assess the influence of weeding frequency and mulching on the growth and yield of leek (Hybrid/Carentan F) in the wolaita zone, at Ambe Kebele Bombe woreda.

Materials and Methods

Experimental Site

The experiment was carried out for two consecutive growing seasons (2012 and 2013) at the Boloso Bombe model in Ambe Kebele, Farmer land, Bombe. The site is located at latitude of 07° 35' N and longitude of 06° 08' E and is 1000 m above sea level, in Wolaita zone, Bombe, where the dry seasons are dry and hot while, wet seasons are cool. The rainfall spans between April to November with peak in June. The dry season extends from December to March. The mean annual rainfall is 1460mm per annum with an annual temperature range of 18°C - 32°C. The mean relative humidity (RH) is 60% (Meterological data, 2011). The major soil order within the experimental site is Gley soil (Birhanu and Dawit, 2019).

Determination of Soil Physical Properties

Soil moisture content was taken at 30 and 60 days after transplanting. Five undisturbed samples were collected at 0-15cm depth from each plot using core samplers and were used for the determination of gravitational moisture contents after oven dried at 100^0C for 24 hours. Soil temperature was determined at 15.00 hours (3pm) with a soil thermometer inserted to 5cm depth. Five readings were made per plot at each weekly determination.

Soil Sampling and Analysis

In order to determine some chemical properties of the soil on per plot basis, soil samples were collected from each plot at 30 and 60days after transplanting. Soil sample was analysed in the laboratory for N, P, K, pH, organic carbon. Total N (%) was determined by the macro-Kjeldahl method (Bremner, 1982). Available P (ppm) was found using Bray I method according to Olsen (1982). Soil pH values were obtained by using a HI9813-5 portable pH/EC/TDS/°C meter (Karic *et al.*, 2005). Soil organic carbon was determined by Walkley-Black procedure (Megersa *et al.*, 2017 and EhioSIS (2016).

Field Methods

A split plot experiment was laid out in a randomized complete block design (RCBD) with three replications to randomize the weeding-frequency levels and mulch methods in the main and sub-plots, respectively. The experiment comprised of two weeding-frequency levels, i.e. weeding-frequency (WF) and no-weeding (NWF) and six mulch materials, i.e. black polythene, white polythene, maize straw, palm fronts, grasses and no mulch. The treatments were carried out on the same plots in 2012 and 2013 growing seasons. The size of each plot was 5.0 m long and 3.0 m wide. A buffer zone of 2.0 m spacing was provided between plots. In both growing seasons, one of the most commercial varieties of leek cv. Carentan F was transplanted manually at a spacing of 60cm on a raised bed at both sides. Before transplanting, half the recommended levels of N (150 kg ha^{-1}) and recommended levels of P (100 kg ha^{-1}) and K (50 kg ha^{-1}) were used as Urea, TSP (triple super phosphate) and MOP (muriate of potassium), respectively. The remaining half recommended level of N was applied at flowering. pedimethalin (1.5L ha^{-1}) was also applied for weeds control before transplanting. Leek was transplanted on 25th August when the soil was well watered in all treatments. Both black and white plastic-film measuring 5 m long × 3 cm wide and 0.25 mm thick was used to cover the experimental beds (raised beds, 25 cm high) of appropriate plots and was held down with forked strong and pegs to prevent it from were blown away by the wind. Organic mulch was also spread on plots at rate of 10kg per $45m^2$. This was done one week before transplanting. Leek plants were weeded with frequency measuring 65cm, 5cm base of which was inserted to the soil. During the growing season, the insecticides and fungicides were applied according to general local practices and recommendations. All other necessary operations except those under study were kept normal and uniform for all the treatments.

Weeds Characters

At 30 and 60 DAT (days after transplanting), weed samples were collected from two 50 cm × 50 cm quadrates randomly laid per plot. The weeds were identified up to species level and were clipped at soil surface, oven-dried at 80°C for 48 hours and weighed to determine the dry matter (DM).

Results and Discussion

Effect of different mulch materials and weeding-frequency on soil temperature and moisture content are presented in Table 1. Temperatures of plots mulched with black and white polythene were higher than plots with organic mulch and the control in this experiment. The plots mulched with maize straw, palm fronts and grasses are slightly higher than control (no much) (Table 1). Hooda *et al.*, (1999) and Rajbir (2005) reported higher temperatures with the use of different mulches. Mulch regulates soil temperature, creates suitable condition for germination, improve soil moisture (Patil and Basad, 1972). Improves soil physical conditions by enhancing biological activity of soil fauna and thus increases soil fertility (Lal, 1989). Plots with strong weeding-frequency had higher soil temperature compared with no strong Weeding-frequency plots. The higher temperature observed could be due to ease of sun rays interception by the soil created by weeding-frequency.

Higher soil moisture was observed in plot with polyethylene mulch when compared with plots with organic mulch and the control (Table 1), the result is in line with the finding of Ramakrishna *et al.*, (2006), they reported the moisture conserving property of polyethylene mulches. Organic mulches (maize straw, palm fronts and grasses) recorded slightly higher soil

moisture than the control. Tonev (2000) and Singh (2005) also reported the ability of organic mulch to conserve soil moisture was appreciably lower than that of the polyethylene mulch. Plot with no mulch recorded least moisture content in this experiment. The result is in line with the finding of (Bond *et al.,* 2003). No strong weeding-frequency plots had higher soil moisture content than strong weeding-frequency plots. The observed higher moisture recorded in no strong weeding-frequency plots could be due to the foliage of leek that spread on the soil and acted like cover crop, thereby reduces the rate of soil evaporation, Agble (1975).

Effect of different mulch materials and weeding-frequency on soil pH, nitrogen, and phosphorus and soil organic matter are presented in Table 2. There was no significant difference in soil pH as result of treatments imposed. Effect of different mulch materials was significant on nitrogen, phosphorus and soil organic matter. Plots with organic mulch (maize straw, palm fronds and grasses) had similar effect on nitrogen, phosphorus and soil organic matter. These were significantly higher than plots with polyethylene mulch irrespective of their colour and no mulch plots. The highest values of nitrogen, phosphorus and soil organic matter occurred in plots treated with maize straw. Plots treated with white polyethylene recorded least values of these parameters. Effect of weeding-frequency was not profound on soil pH, nitrogen, phosphorus and organic matter.

Effect of different mulch materials and weeding-frequency on growth components of leek are presented in Table 3**.** The result shows significant difference in growth parameters considered. Polyethylene mulch had significant beneficial effect on vegetative growth of leek plants (Table 3). Gordon *et al.,* (2010) reported that plastic mulch produced higher plant height, fresh weight, early and total yield when compared with other mulches.

Though, organic mulches (maize straw, palm front and grasses) also stimulated vegetative growth compared to un- mulched plots but to a lesser extent than the polyethylene mulches. Among the polyethylene mulch used, black polyethylene recorded better performance in term of plant height, number of branches, number of leaves and stem girth with mean values of 77.2cm, 6.65, 26.8 and 0.92cm respectively. Awodoyin *et al.,* (2007) reported that mulched leek plants had more branches than the un- mulched plants, which supported the present results. Hamid *et al.,* (2012) opined that plants grown over plastic mulches considerably produced the most number of leaves relative to control treatment. The microclimate condition improved by the mulches might have provided a suitable condition for producing higher number of leaves in the plants. Franquere, (2011) reported that lettuce grown on red mulch had most number of leaves compared to the other coloured mulch treatment. Table (3) also presented the influenced of different mulching materials on days to 50% flowering in leek. In general, different mulch materials influenced flowering in leek. Flowering was earlier in all the mulch plots compared to the control. The earliest advanced flowering was observed in plots with black polyethylene (44 days). The result corroborated the findings Tursum *et al.,* (2007) and Singh (2005). All the growth characters considered were significantly influenced by weeding-frequency; leek Weeded with strong had higher plant height, number of branches, number of leaves and stem girth than no weeded plants. Flowering was earlier in all the weeded plants compared to the no Weeded plants (Table 3). This could be due to better photosynthetic activity created by good arrangement of the leaves.

Number of weeds identified and dry weight of the weed are presented in (Table 4). Weeds did not grow at all, in plots mulched with black polyethylene, while other mulches allowed weeds growth even white polyethylene. Dry weight of weeds on white polyethylene, maize straw, palm fronts and grasses are 114.2, 98.4, 116.3 and 198.4 g/m^2 respectively. The result indicated that colour of polyethylene dictated the light intensity reaching the soil surface; white polyethylene did not restrict the light intensity and hence, failed to reduce the photosynthetic activity of the weeds. Organic mulch retarded weeded growth compared to control. The result confirmed with the earlier observation of Ramakrishna *et al.,* (2006) and Zaragoza (2003) and Singh (2000). Effect of Weeding-frequency was not profound on weeds characters observed.

Table 5 presented the effect of different mulch materials on yield and yield components of leek. Significant differences were observed in number of shafts per plant, shaft weight (g) shaft length (mm), shaft diameter (mm) and shaft yield per plant (kg) as influenced by different mulch materials. Black polyethylene mulch treatment gave the highest number of shaft per plant, individual shaft weight, shaft length (mm), shaft diameter (mm) and shaft yield per plant.

Table.1 Effect of Different Mulching Materials and Weeding-frequency on Soil Physical Properties (2013 and 2014).

Mulching methods	Soil moisture		Soil temperature	
	2013	2014	2013	2014
Black polyethylene	14.3a	16.2a	27.4a	32.6a
White polyethylene	13.6a	16.0a	29.7a	33.2a
Maize straw	11'9bc	11.6b	24.1ab	28.7b
Palm fronds	12.6ab	11.0b	23.0b	28.3b
Grasses	10.8c	12.4b	23.3ab	29.9ab
No mulch	8.3d	10.1b	22.8b	28.4b
Weeding-frequency methods				
Weeding-frequency	12.6a	13.4a	26.3b	27.4b
No Weeding-frequency	09.3b	11.2b	29.6a	31.3a

In a column, figures bearing same letter(s) do not differ significantly at 5% level of probability by DMRT.

Table.2 Effect of Different Mulch Materials and Weeding-frequency on Soil chemical Properties (mean of 2013 and 2014).

Mulching materials	Soil pH	Nitrogen	Phosphorus	Organic matter
Black polyethylene	6.3a	1.63ab	2.62c	1.98b
White polyethylene	6.3a	1.54b	2.44c	2.12b
Maize straw	6,3a	1.69ab	4.11a	3.43a
Palm fronds	6.3a	1.90a	3.98a	2.91a
Grasses	6.3a	1.87a	3.86a	2.74a
No mulch	6.4a	1.68ab	2.93bc	2.01b
Weeding-frequency methods				
Strong Weeding-frequency	6.3a	1.87a	3.56a	2.67a
No Weeding-frequency	6.3a	1.74a	3.47a	2.56a

In a column, figures bearing same letter(s) do not differ significantly at 5% level of probability by DMRT.

Table.3 Effect of Different Mulch Materials and Weeding-frequency on growth components of leek (mean of 2013 and 2014).

Mulching materials	Plant height(cm)	Branches per plant	No of leaves	Stem girth (cm)	Dry weight (cm)	Day to 50% flowering
Black polyethylene	77.2a	6.65	26.8a	0.92a	265.3^{a}	**44^{a}**
White polyethylene	74.6a	4.98	23.4a	0.84a	256.4^{a}	**46^{a}**
Maize straw	62.8b	3.75	21.0ab	0.71ab	198.3^{ab}	**53^{ab}**
Palm fronds	63.4b	3.96	18.9b	0.62b	202.4^{ab}	**53^{ab}**
grasses	61.8b	3.74	19.6b	0.76ab	196.5^{ab}	**54^{ab}**
No mulch	44.6c	2.89	18.4b	0.56b	146.2^{b}	**57^{b}**
Weeding-frequency methods						
Strong Weeding-frequency	78.6^{a}	7.4^{a}	26.5^{a}	0.98^{a}	284.0^{a}	**47^{a}**
No Weeding-frequency	56.4^{b}	4.6^{b}	19.3^{b}	0.61^{b}	166.4^{b}	**55^{b}**

In a column, figures bearing same letter(s) do not differ significantly at 5% level of probability by DMRT.

Table.4 Effect of different mulch materials and weeding-frequency on identified weed and its dry weight (mean of 2013 and 2014)

Mulching methods	Identified weeds		Dry weight of weeds identified	
	2013	***2014***	***2013***	***2014***
Black polyethylene	0	0	0	0
White polyethylene	5b	6b	104.2b	123.6b
Maize straw	5b	8b	98.4b	106.1b
Palm fronds	7b	11b	116.3b	187.9b
Grasses	5b	9b	198.4b	201.0b
No mulch	14a	21a	470.6a	632.8a
Weeding-frequency Methods				
Strong Weeding-frequency	8a	13a	116.0a	108.3a
No Weeding-frequency	6a	10a	134.2a	126.4a

In a column, figures bearing same letter(s) do not differ significantly at 5% level of probability by DMRT.

Table.5 Effect of Different Mulch Materials and Weeding-frequency on yield components of leek (mean of 2013 and 2014)

Mulching methods	Pseudo stems per plant	Shaft weight(g)	Shaft length(mm)	Shaft diameter(mm)	Yield per plant(kg)
Black polyethylene	29.6a	69.3a	58.3ab	42.1a	2.05a
White polyethylene	24.4ab	68.7a	61.8a	46.3a	1.81a
Maize straw	21.4b	64.8a	66.4a	38.6	1.39b
Palm fronds	22.8b	63.6a	60.3a	43.4a	1.45ab
grasses	21.3b	59.8ab	63.4a	37.1ab	1.27b
No mulch	16.1c	46.2b	49.3b	26.4c	0.74c
Weeding-frequency methods					
Weeding-frequency	26.7a	74.8a	62.4a	45.5a	2.16a
No Weeding-frequency	14.3b	41.3b	46.2b	34.6b	1.04b

In a column, figures bearing same letter(s) do not differ significantly at 5% level of probability by DMRT.

However, these were statistically higher than plots with organic mulches (maize straw, palm fronts and grasses) and the control (Table 5). The greatest yield was observed in plots mulch with black polyethylene and may be due to complete elimination of weeds, high soil moisture availability and moderates soil temperature during cropping seasons.

The result is in agreement with observations of Ashworth and Harrison (1983) and Singh (2005) they reported higher yield under black polyethylene mulch and ascribed this to reduced nutrients losses due to weed control and improved hydrothermal regimes of soil. Similarly, white polythene produced significantly higher yield compared to the organic mulches and control. The increase is due to greater number of shafts per plant as well as their larger size. Lower yield in white polyethylene mulch compare to black polyethylene may be due to poor weed control. Among the organic mulches, palm fronts were found better for increase leek shafts number and shaft yield per plant (Table 5).

However, shaft yield was significantly higher under organic mulches than the control. The observed results confirm the findings of Karkanis *et al.*, (2011); Hooda *et al.*, (1999) and Singh (2005). Weeding-frequency significantly affect all yield characters observed, plot with strong weeding-frequency recorded greater values of leek number of shafts per plant, shaft weight (g) shaft length(mm), shaft diameter(mm) and shaft yield per plant (kg). The result confirmed the work of Quinn (1973b) who reported that marketable yield of leek under wet condition was significantly increased by weeding-frequency of leek plants.

Recommendations

Mulch moderates soil physical condition, creates suitable condition for germination, and stimulates vegetative growth, thereby increased leek shafts which resulted in higher shaft yield of the leek. However, better and stable shaft yield of leek could be obtained with the practice of mulching in combination with weeding-frequency. It recommended that mulching should be carried out together with Weeding-frequency for higher leek shaft yield and black polyethylene should be use as mulch material in the study area. There is the need to carry out further studies especially cost benefit analysis and multi-locational trials in future studies.

References

Amador–Ramirez, M. D. 2002. Critical period of weed control in transplanted chili pepper. Weed Res. 42:203–209.

Baumann, D. T., M. J. Kropff, and L. Bastiaans. 2000. Intercropping leeks to suppress weeds. Weed Res. 40:359–374.

Buckelew, J. K., D. W. Monks, K. M. Jennings, G. D. Hoyt, and R. F. Walls. 2006. Eastern black nightshade (*Solanum ptycanthum*) reproduction and interference in transplanted plasti-culture tomato. Weed Sci. 54:490–495.

Bukun, B. 2004. Critical periods for weed control in cotton in Turkey. Weed Res. 44:404–412.

Ethio-SIS (Ethiopia Soil Fertility Status). 2016. Fertilizer Recommendation Atlas of the Southern Nations, Nationalities and Peoples' Regional State, Ethiopia. Pp 81.

Evans, S. P., S. Z. Knezevic, J. L. Lindquist, C. A. Shapiro, and E.E. Blankenship. 2003. Nitrogen application influences the critical period for weed control in corn. Weed Sci. 51:408–417.

Karkanis A., Bilalis D., Efthimiadou A., Katsenios N., 2012. Comparison between conventional and organic weed management: growth and yield of leek (*Allium porrum* L.). Hort. Sci. (Prague), *39*: 81–88.

Knezevic, S. Z., S. P. Evans, and M. Mainz. 2003. Row spacing influences the critical timing for weed removal in soybean (*Glycine max*). Weed Technol. 17:666–673.

Megersa, G. H. 2017. Onion (*Allium cepa* L.) yield improvement progress in Ethiopia: A review. *International Journal of Agriculture and Biosciences*, *6* (5), 265–271.

Tursun, N., S. C. Karacan, A. O. Tursun, and H. Bilir. 2004. Effects of weed competition periods on the yield of leek. Plant Dis. Prot. 19:309–311.

Tursum N., Bukun B., Karacan S. C., Ngouajio M., Mennan H., 2007. Critical period for weed control in leek (*Allium porrum* L.). *Hort Science*, *42*: 106–119

Zaragoza, C. 2003. Weed management in vegetables. Weed management for developing countries FAO plant production and protection paper 120 addendum 1. 9 Sept. 2006..

Ramakrishna, A., H. Tam, S. Wani, T. Long, 2006. Effects of mulch on soil temperature, moisture, weed infestation and yield of groundnut in northern Vietnam. Field Crops Research, 95 (2-3): 115-125.

Awodoyin, R. O. Ogbeide, F. I., & Oluwole, O. (2007). Effects of Three Mulch Types on the Growth and Yield of Leek (*Allium var. Porrum* L) and Weed Suppression in Ibadan, Rainforest-savanna Transitions Zone of Ethiopia, *Tropical Agricultural Research & Extension*, *10*, 53-60, 2007.

Babalola, T. S. (2010). Land Evaluation Studies of Two Wetland Soils in Ethiopia. An MSc Thesis Submitted to the Department of Crop, Soil and Environmental Sciences, University of Ado –Ekiti. Pp 141.

Karkanis A., Bilalis D., Efthimiadou A., N. Katsenios2 (2011). Leek Response of Trickle Irrigation and Black Polyethylene Mulch. J. Amer. *Soc. Hort. Sci. 113*(4), 543-546.

Bremner J. M. (1982). Total nitrogen. In: Page A.L. Miller R.H. and Keeny D.R. (Eds.). Methods of Soil Analysis. Part-2, 2nd Ed. Agronomy Monograph No. 9. ASA and SSSA, Madison, WI. pp. 915-928.

Brault, D., Stewart, K. A., & Jenni, S. (2002). Optical Properties of Paper and Polyethylene Mulches Used for Weed Control in Lettuce, *Hort-Science*, *37*, 87-91, 2002.

Chakraborty, R. C., & Sadhu, M. K. (1994). Effect of Mulch Type and Colour on Growth and Yield of Tomato *(Lycopersicon esculentum* Mill). *Indian J. Agric. Sci. 64*, 608-612.

Decoteau, D. R., Daniel, D. D., Kasperbauer, N. J., & Hunt, P. G. (1986). Coloured Plastic Mulches and Leek Morphogenesis. *Proc. Natl. Agr.Plastic Congr. 19*, 240 -248.

Franquera, E. D. (2011). Influence of Different Colored Plastic Mulch on the Growth of Lettuce (Lactuca sativa), *Journal of Ornamental and Horticultural Plants*, *1*(2), 97-104, September.

Fattorusso E, Lanzotti V, Taglialatela-Scafati O, Cicala C. The flavonoids of leek, *Allium porrum*. Phytochemistry. 2001;57(4):565-9

Gordon, G. G. Foshee, G. W., Reed, S. T., Brown, J. E., & Vinson, E. L. (2010). The Effects of Colored

Plastic Mulches and Row Covers on the Growth and Yield of Okra, *HortTechnology, 20*(1), 224-233.

Ham, J. M., Kluitenberg, G, & Lamont, W. (1993). Optical Properties of Plastic Mulches Affect the Field Temperature Regime, *Journal of the American Society for Horticultural Science, 118*, 188-188.

Hamid R. R. Farzad, H., & Ramin, R. (2011). Effect of Colored Plastic Mulches on Yield of Leek and Weed Biomass. *International Journal of Environmental Science and Development, 3*(6).

Hanelt P. Mansfeld,s encyclopedia of agricultural and horticultural crops. Hanelt, P. and Institute of Plant Genetics and Crop Plant Research, Springer-Verlag, Berlin, Heidelberg, New York. 2001;

Higgins, G. M. (1957). Preliminary Report on the Detailed Land, Soil and Contours Survey of River Rine Area of School of Agriculture, Kabba. Soil Survey Bulletin No 31: 28p.

Hooda R S, Singh J, Malik V S & Batra V K (1999). Influence of Direct Seeding, Transplanting Time and Mulching on Leek Yield. *Veg. Sci. 26*(2), 140-142.

Iharra, L., Flores, J., & Diaz-Pérez, J. C. (2001). Grow and Yield of Muskmelon in Response to Plastic Mulch and Row Covers" *Scicntia Hort, 87*, 139-145. http: //dx. doi. org/ 10.1016/ S0304-4238(00)00172-2

Karic L, Vukasinovic S, Znidarcic D. Response of leek (*Allium porrum* L.) to different levels of nitrogen dose under agro-climate conditions of Bosnia and Herzegovina. Acta Agriculturae Slovenica. 2005;85(2):219-26

Kwon Y S, Leo Y S, Park S K & Ko K D (1998). Effect of Different Mulch Material on the Soil Environment, Growth and Yield of Red Pepper *(Capsicum annum* L.). *Research* Reports of Rural Development Administration, *Horticulture, Republic of Korea, 30*, 9-17.

Lamont, W. J. (1993). Plastic Mulches for Production of Vegetable Crops, *HortTechnology, 3*(1), 35-39.

Lal, R. (1989). Conservation Tillage for Sustainable Agriculture: Tropic versus Temperate Environments. *Adv. Agron. 42*, 147-151.

Shakouri M J, Hassandokht M R, Kalateh J S, Larijani K, Ghanati F. Studying the morphological properties, nutrients and allicin content of Iranian Taree accessions (*Allium ampeloprasum* Taree group). Eur Asian Journal of Bio Sciences. 2018;12(1):13-8.

Rahman K, Lowe G M. Garlic and cardiovascular disease: A critical review. The Journal of Nutrition. 2006;136(3 Suppl):736s-40s.

Mirshekari, B. Rajablarijani, H. R. AghaAlikhani, M. Farahvash, F., & Rashidi, V. (2002). Evaluation of Biodegradable and Polyethylene Mulches in Sweet Corn Production, *International Journal of Agriculture and Crop Sciences, 4*(20), 1540-1545.

Nelson, D. W., & Sommers, L. E. (1982). Total Carbon, Organic Carbon and Organic Matter. In: Page A. L. Miller R. H. and Keeny D. R. (Eds.). Methods of Soil Analysis. Part-2, 2nd Ed. Agronomy Monograph No. 9. ASA and SSSA, Madison, WI. pp. 539-579.

Ngouajio, M., & Ernest, J. (2004). Light Transmission through Colored Polyethylene Mulches affected Weed Population. *Hort Science, 39*(6), 1302-1304.

Olsen S. R. (1982). Phosphorus. In: Page A. L. Miller R. H. and Keeny D. R. (Eds.).

Methods of Soil Analysis. Part-2, 2nd Ed. Agronomy Monograph No. 9. ASA and SSSA, Madison, WI. pp. 403-430.

Patil, A. V., & Basad, A. D. (1972). Effect of Mulching Treatments on Soil Properties Growth and Yield of Leek. *Indian J. Hort, 29*(2), 177-205.

Quinn, J. G. (1973b). An Evaluation of Methods of Mulching and Weeding-frequency Leek Grown During the Rains at Samaru, *Ethiopia Horticulture Research Journal, 13*, 97-104.

Rajablarijani, H. R., & Aghaalikhani, M. (2011). Non-Chemical Weed Control in Winter Canola (*Brassica napus* L.), in *Proc. 2nd International Conference on Agricultural and Animal Science. IPCBEE, 22*, 30-34.

Singh, R. (2005). Influence of Mulching on Growth and Yield of Tomato (*Solanum Lycopersicum* L.) in North Indian Plains. *Veg. Sci. 32*(1), 55-58.

Sweeney D W, Gratz D A, Bottcher A B, Locascio S J & Campbell K L (1987). Leek Yield and Nitrogen Recovery as Influenced by Irrigation Method, Nitrogen Source and Mulch. *Hort. Sci. 22*, 27-29.

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