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The Effect of Pre-Sowing Plants on Amount of the Soil Organic Matter

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ABSTRACT

The vegetation is one of the factors that are active soil building. Cover crop is a general term that encompasses a wide range of plants that are cultivated with different ecological reasons. To evaluate the effect of pre-cultured plants on increasing of a soil organic matter, the experiment base on randomized complete block design was performed. The factors included perko, oily radish and composition of clover with phacelia. According to the analysis of variance there was significant difference ($P<0.01$) between plants at dry and green fodder and also there was significant difference ($P<0.05$) between plants at nitrogen, protein and digestible protein percentage, but did not significant difference between treatments at soil organic matter. The mean comparison results showed that the highest amount of green fodder obtained at oily radish, the highest dried fodder obtained at perko and oily radish and the highest nitrogen, protein and digestible protein percentage obtained at perko.

KEYWORDS: Clover, Oily radish Phacelia, Pre-culture, Perko.

INTRODUCTION

Cover crop is a general term that encompasses a wide range of plants that are cultivated with different ecological reasons. This plant may be growth at rotation or simultaneously with the main plants. According to the aim of cover crop cultivation they called green fodder, suffocating plants, live mulch or trap plants (Upadhyava and Blackshaw, 2007). The Brassica genus has about 160 species and mostly of them are annuals and biennial. The plants of this genus have great potential for fodder provide (Khzanli et al., 1996). With the advancement of the plant breeding science new varieties have been produced to provide oil and forage. Hybrids resulting from crosses between tetraploid species of Brassica genus with commercial names such as perko PVH, noko, boko and tifon cultured at large scale (Kashani et al., 1985). These plants are good for livestock feed and until forming seed pod is not roughage and feed value is preserved. Their dry matter is relatively low but amount of dry fodder protein in some varieties is 24-26%. Total digestible matter of the in vitro condition is 91% and digestibility of organic matter in winter fodder plants in ruminant animals mentioned 93% (Kashani et al., 1985). Perko obtained by crossing tetraploid plants of winter canola and Chinese cabbage. Oily radish is a member of Brassica genus and use as an oil and green fodder (Jung et al., 1986). Oily radish is the development type of mustard and cultivated in order to obtain oil. This plant in many countries such as Canada cultured in gardens as a cover plant. Oily radish has quickly growth in cool seasons. Thus it can be seen planting in early spring as a cover plant or green fodder at May until June (Marlanne, 1994) .

The experiment in the Moldovan showed that mean fresh matter yield of perko was 55.8 ton/ha and mean dry matter yield was 5.76 ton/ha. By growing of perko at aquaculture in spring produced seed was 2.03 ton/ha and in the rainfed culture was 1.1 ton/ha. The dry matter analysis showed that perko has 19.1% protein at total plant and 32% at leaves (Lupashku, 1980). Lichner (1990) in the three-year experiment were planted forage turnips, perko, canola, rye and wheat alone and mixed with vetch in Nitra region. The results showed that the maximum dry matter production was 8 ton/ha at perko. Venenl and Axamlt (1980) to compare the yield of forage plant include corn, sunflower, winter canola, perko and cabbage at experiment in 1976-1978 years in Slovakia. The results showed that application of 160 kg nitrogen at winter canola and corn gave maximum dry matter 4.52 and 4.41 respectively. In recent decades be seem clover due to rapid growth, high qualities and quantities of forage have been considered. This plant has the good produce potential and use to increases of soil fertility and to provide green manure used in rotation with other crops. This plant can stabilized 100-200 kg/ha nitrogen and does not cause bloating in the animals and produce 3.75 kg/ha dry matter (Clark, 2007). The amount of crude protein at berseem clover is 22% and its fiber is 32% (Karsli et al., 1999). Berseem clover has 18-28% protein (Clark, 2007). One way to increase soil organic matter is the use of green manure crop in a rotation. Green manure is help to maintain the nitrogen and other nutrients in the soil and in some cases help to accumulation of them in the soil. Also the green manure controls the soil erosion, pests and weeds. Planting of winter cover crops are effective in soil fertility and increase yield of spring plants (Baldwin and Creamer, 2006). The aim of this study was compare the yield of different species and the

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possibility of growth and develop of the in this area and select better species in terms of dry and fresh fodder production, nitrogen and protein levels and increase of soil quality.

MATERIALS AND METHODS

This experiment was performed at 2013-2014 crop year in randomized complete block design with four replicates at Agricultural Experiment Station in Islamic Azad University of Karaj (Mahdasht). The site at longitude: 35˚ and 55′ N and latitude: 50˚, 54′ E at 1312.5 meters above sea. The studied factors included cover crops such as perko, oily radish and combination of clover and phacelia. After preparing of the soil includes tillage (plow, disk and etc) plan map ruined and cover plants of the Brassica family were cultured at mid-March and the irrigation was done a regular basis. The space in between rows was 15 cm and the space of plants on the rows was 10 cm. after full maturation of studied cover plants, harvested and indices was measured. Then, for examining of the effects of cover plants on subsequent crops (sweet corn), they are crushed and added on the surface layer of the soil. Organic matter was determined by dry combustion. For this purpose the samples were beaten and passed through 80 mesh sieve and then 2 g of that transferred to oven with 105˚C for 24 h. then, the samples were weighted and dry weight calculated. Then the samples transferred to electrical furnace at 550˚C for 24 h and organic matter was oxidized by dry combustion. Finally samples weighted and organic matter percentage calculated.

Nitrogen was measured by kejeldal method. 1 g of samples sieved and transferred to the digestion flask of kejeldal and acid and catalysts was added. After digestion, the colorimetric titration was used and all sample nitrogen converted to ammonia and total nitrogen was measured with a spectrophotometer. For investigation of protein content, the amount of nitrogen multiplied at 6.25 and crude protein were obtained. Then the amount of crude protein multiplied at 0.93 and then reduced 3.48 from it and amount of digestible protein obtained (Sparks et al., 1996). Analysis of variance was performed with Spss software and mean comparison was conducted by Duncan's multiple range tests at 5% probably.

RESULTS AND DISCUSSION

Green fodder yield: according analysis of variance between studied plants show that plants were significantly ($P<0.01$) difference (Table 1). The highest green fodder was 54.25 tons/ha at oily radish and the lowest amount of that was 13.33 tons/ha at clover and phacelia combination (Figure 1). This results are correspond with Lupashku (1980) and Veneni and Axamit (1980) results.

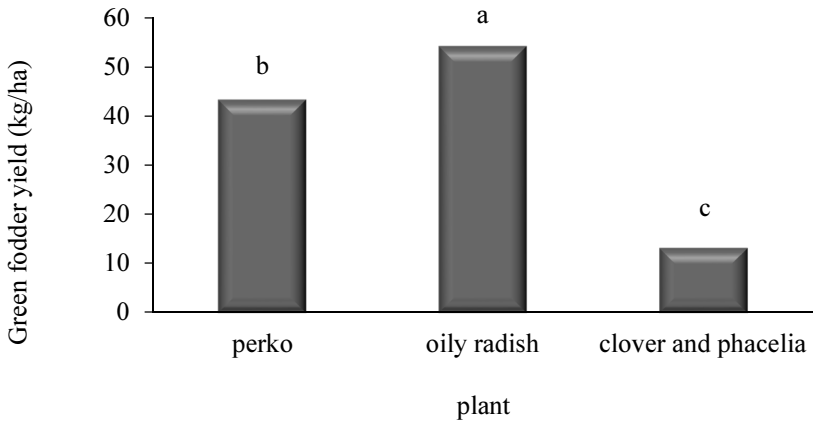

Figure 1. The effect of green fodder yield under the influence of pre-cultured plants

Dry fodder yield: according analysis of variance between studied plants show that plants were significantly ($P<0.01$) difference (Table 1). The highest dry fodder was 7.23 and 7.83 tons/ha at oily radish and perko, respectively. The lowest amount of dry fodder was 3.35 tons/ha at clover and phacelia combination (Figure 2).

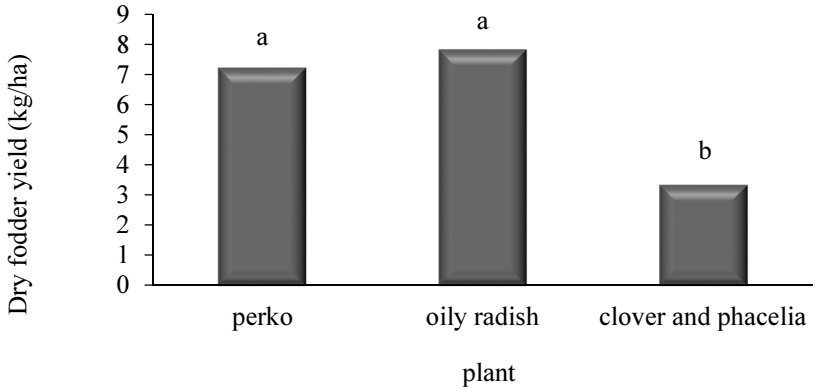

Figure 2. The effect of dry fodder yield under the influence of pre-cultured plants

Nitrogen percentage: the analysis of variance (Table 1) showed that studied plants significantly difference ($P<0.05$). According to the mean comparison the highest nitrogen percentage (2.9%) obtained at perko and the lowest amount of that (2.6%) obtained at clover and phacelia combination (Figure 3).

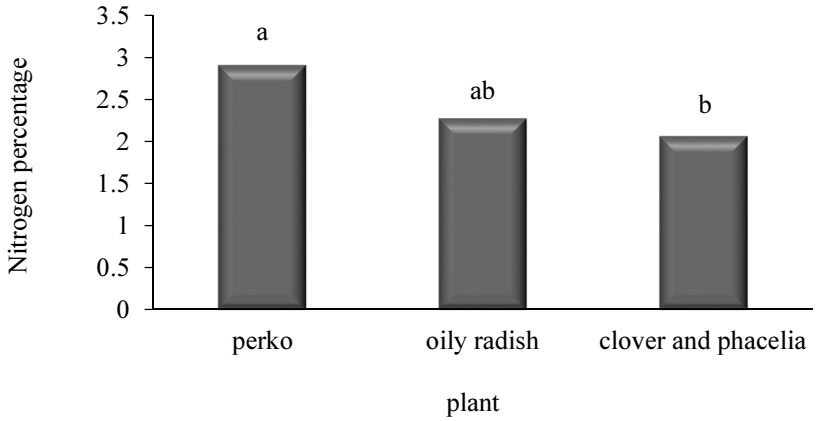

Figure 3. The effect of nitrogen percentage under the influence of pre-cultured plants

Protein percentage: the analysis of variance showed that there was significant difference ($P<0.05$) between studied plants (Table 1). The mean comparison results indicated that the highest protein percentage was 18.11% at perko and the lowest amount of that was 12.84% at clover and phacelia combination (Figure 4). This results are correspond with Lupashku (1980) and Veneni and Axamit (1980) results.

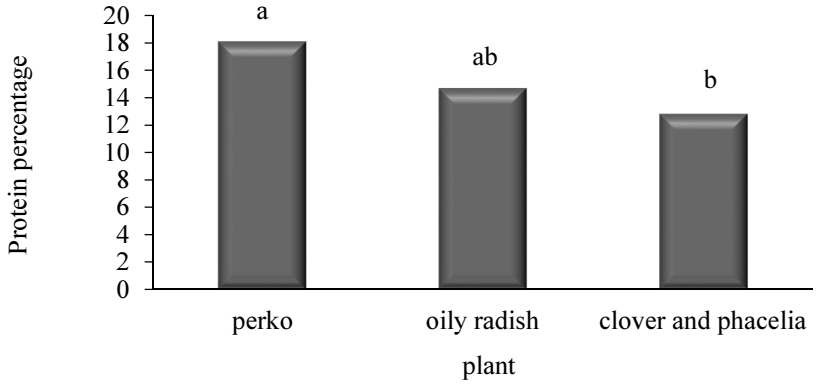

Figure 4. The effect of protein percentage under the influence of pre-cultured plants

Digestible protein percentage: the analysis of variance results showed that studied plants had significant difference ($P<0.05$) (Table 1). The mean comparison results indicated that the highest digestible protein percentage was 13.36% at perko and the lowest amount of that was 8.46% at clover and phacelia combination (Figure 5).

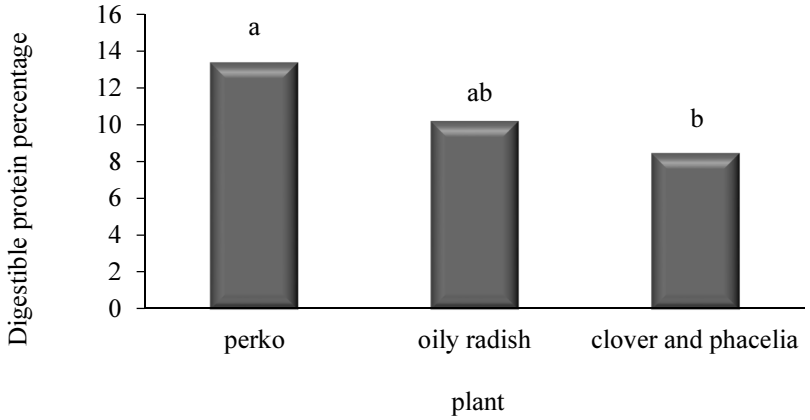

Figure 5. The effect of digestible protein percentage under the influence of pre-cultured plants

The soil organic matter percentage: analysis of variance results showed that studied plants did not significant difference (Table 1) (Figure 6). One way to increase soil organic matter is the use of green manure in crop rotation. Green manure is help to nitrogen and other nutrient maintains and also helps to accumulation of them in the soil. Therefore, we examined the situation of soil organic matter and the results showed that adding of plants survival to soil after its decay, improves soil conditions and soil microorganism's activity. These results are consistent with Baldwin and Creamer (2006) results.

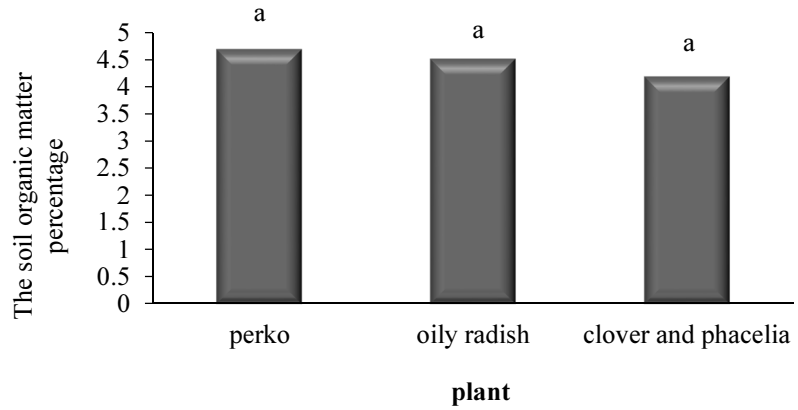

Figure 6. The effect of the soil organic matter percentage under the influence of pre-cultured plants

Table 1. Variances analyze results of perko, oily radish and composition of clover with phacelia pre-cultured plants on the fodder yield and the increasing of soil organic matter

S.O.V	df	Green fodder yield	Dry fodder yield	Nitrogen percentage	Protein percentage	Digestible protein percentage	The soil organic matter percentage
Block	3	17.65^{ns}	0.52^{ns}	1.09^{*}	47.76^{*}	41.3^{*}	1.64^{**}
Plant (a)	2	1797.69^{**}	23.59^{**}	0.77^{*}	28.54^{*}	24.69^{*}	0.26^{ns}
Error	6	34.13	0.92	0.14	5.24	4.53	0.1
CV%		15.79	15.62	15.77	15.04	19.95	6.93

**, * and ns are significantly at 1%, 5% and not significant, respectively

REFERENCES

1. Khazanlipour, A., Kashani, A., Nourmohammadi, Gh. 1996. Evaluation the rates and density of cultured plant on quality and quantity yield of fodder at mixed forming of noko and berseem clover in Ahvaz climate. M.Sc thesis, Shahid Chamran University of Ahvaz. (In Persian).
2. Kashani, A., Bohrani, J., Alemi, S., Mesgarbashi, M. 1985. The report of identified three varieties of forage plants of the Brassica genus and report preliminary results in Khuzestan. Journal of Agriculture. 11:74-78. (In Persian).
3. Baldwin, K.R., Creamer, N.G. 2006. Cover Crops for Organic Farms. North Carolina Cooperative Extension Service Publications Available on- -line at:http:// www. Cefs. Ncsu.Edu/PDFs/Updated%20PDF%20for%20 web/Cover crops FINAL Pdf Jan 2009.pdf.
4. Clark, A. 2007. Managing cover crops profitability, (3rd Ed.). Sustainable Agriculture Network, Beltsville. MD.118-224.
5. Jung, G.A., Byers, R.A., Pancieran, M.F., Shaffier, J.A. 1986. Forage dry matter accumulation and quality of turnip, swide, rape, chinese Hybrids and kale in eastern U.S.A. Agron J. 78:24:245-253.
6. Karsli, M.A., Russell, J.R., Hersom, M.J. 1999. Evaluation of berseem clover in diets of ruminants. Consuming corn crop residues. J of Amer. Soc. of Animal Sci. 77:2873-2882.
7. Lichner, S. 1990. Biological and crop production conditions for growing winter catch crops. Pol'nohospodárstvo 1990 Vol. 36 No. 7 pp. 585-595.
8. Lupashku, M.F. 1980. Perko RVH - a new fodder crop. Vestnik Sel'skokhozyaistvennoi Nauki, Moscow, SSR 1980 No. 6 pp. 94-98.
9. Marlanne, S. 1994. Rodale Institute; Managinng Cover Crops Profitably, Sustainable Agriculture Research and Education Program, USDA.
10. Sparks, D.L., Page, A., Helmke, P., Loeppert, R., Soltanpour, P., Tabatabai, M. 1996. Methods of soil analysis. Part 3-Chemical methods: Soil Science Society of America Inc.
11. Upadhyaya M.K., Blackshaw, R.E. 2007. Non-chemical weed management: Principles, Concepts and Technology. CAB. 240 pp.
12. Veneni, M., Axamit, M. 1980. The use of stubble catch crops for green fodder under irrigation. Eostl. Uroda. 26(6): 651-660.