EFFECT OF ORGANIC MANURE AND PLANTING DATES ON FORAGE YIELD AND QUALITY OF ALFALFA (MEDICAGO SATIVA) AT FAYOUM GOVERNORATE

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ABSTRACT

Two field experiments were carried out at the Experimental Farm, Faculty of Agriculture Fayoum Univ, during the two successive seasons of 2006 and 2007 to study the effect of organic manure levels (20, 40 and 60 m^3/fed.), and planting dates (April in summer season and November in winter season) on forage yield and quality of alfalfa at Fayoum governorate .

The results indicated that :

1- Applying organic manure fertilizer at levels 20, 40 and 60 m^3/fed, had no significant effect on fresh and dry forage yield (ton /fed) during winter and summer seasons with one exception during the 2^{nd} cut in the 2^{nd} season only during summer seasons.

2- The protein percentage was significantly responded to organic manure levels. The maximum values were observed by applying 60 m^3 / fed.

3- Increasing organic manure levels from 20, 40 up to 60 m^3/fed, affected significantly on total carbohydrates.

Key words: Alfalfa, Organic manure, Planting dates.

INTRODUCTION

In Egypt, production and distribution of forage crops have become one of the most problems that lead to shortage in available quantities of fodder around the year, especially in summer season. Under Egyptian conditions, needs for saving lands to cultivate more wheat in order to support peoples with their demands is become strategic goal. The increase of cultivated new reclaimed lands to produce more summer fodder has become the most promising solution to reduce the gap between production and consumption especially under the limited area of the valley.

Alfalfa plant proved highly production as king of forage plants under different ecological region. It is characterized by high growth rate producing several fresh forage cuts with high content of protein, mineral, low fiber and soluble carbohydrates. The whole yield can use directly in feeding animals, especially dairy ones or processed as qualitative hayar silage.

Rizk *et al* (2000 a) showed that organic manure affects crop growth and yield, either directly by supplying nutrients or indirectly by modifying soil physical properties that can improve the root environment and stimulate plant growth

Rizk *et al* (2000 b) found that dry yield as well as accumulated yields for buffel grass, alfalfa and their mixture were increased due to the increasing of FYM .

In respect of the effect of planting dates, **Dowdy *et al* (1986)** found decrease in production due to poor stands was obtained with the later planting

date (seeding dates which were August, September and October). Even though larval populations were more than twice as large in early fall than late fall seedings, yield of early fall seedings averaged (2.500–7.000 Kg/ha) greater for the first two harvests in the 1st year of production.

El-Morsy (1998) detected that crude protein yield of alfalfa was increased while crude fiber content was decreased by adding (40 m^3 /fed.) organic manure. It was noticed that there was no clear trend for total carbohydrates by using different rates of organic manure.

El–Shesheny (1999) found that crude protein %, total carbohydrates %, crude fiber % of alfalfa leaves or stems were not significantly affected by raising organic manure from 10 to 30 m^3 / fed .

Therefore, this research aimed to study the effect of organic manure levels and planting dates on forage yield and quality of alfalfa at Fayoum governorate .

MATERIALS AND METHODS : -

Two field experiments were conducted during 2006 and 2007 growing seasons at the Experimental Farm of Fayoum Faculty of Agric. to study the effect of organic manure levels and planting dates on forage yield and quality of alfalfa varieties at Fayoum governorate..

A split plot design with five replications was used with each planting date. Three organic manure levels (arranged in the main plots), i.e. 20, 40 and 60 m^3 /Fad. Two alfalfa varieties (allocated in the sub – plots) i.e. [Si River (V1) & El Wady El Gaded (V2)].

The subplot area was **7.0 m^2 (2× 3.5 m)**. The preceding winter crop was Sugar beet in winter season and corn in summer season. Sowing date was done 22 April in summer season and 23 November in winter season.

The soil texture was sandy loam with organic matter of 0.76 and 0.77%, EC of 4.01 dS/m and 3.60, pH values of 7.70 and 7.80, Total nitrogen (ppm) of 42.34 and 44.52 in the first and second season respectively. Calcium super phosphate (15.5% P_2O_5) was added before sowing at a rate of 150 kg/ Fadden. The normal cultural practices for growing alfalfa were applied.

Studied characters : -

A – Fresh and dry forage yield (ton/fed.)

The whole plots were harvested to determine total fresh forage yield and then the yield (ton/fed) was calculated. Samples were dried to calculate dry forage yield **.**

B – Chemical analysis: -

1- Crude protein percentage:

Total nitrogen was determined by using the modified micro – kjeldahl method **(Peach and Tracy 1956)** for each component and multiplying it by a factor 6.25 to obtain the protein content.

2- Total carbohydrates percentage :

Total carbohydrates percentage was determined by using the method described by **Smith *et al* (1964).**

Statistical analysis:

Data collected were subjected to the proper statistical analysis of variance of split plot design according to procedure outlined by **Sndecor and Chochron (1980).** To compare treatment means, L.S.D. at 5% level of significance was used according to **Stell and Torrie (1960)**.

All statistical analysis was performed by using analysis of variance technique of **(MSTAT)** computer software package.

RESULTS AND DISCUSSION : -

1 – Fresh forage yield (ton/fed) during Summer seasons :-

- Effect of organic manure levels (A):-

Table (1) show that raise organic manure levels from 20, 40 and 60 m^3 /fed had no significant effect on fresh forage yield with one exception during the 2nd cut in the 2nd season only. Similar trend were obtained by **El–Shesheny (1999), Rizk *et al* (2000a).**

- Effect of varieties (B) : -

The data in table (1) indicate clearly that varieties did not affected significantly affected by varieties during the two growing season with one exception in the 2nd cut during the 1st season only.

- Effect of the interaction between (A * B):-

The data in table (1) indicate clearly that the fresh forage yield (ton/ fed) of alfalfa during summer season, were significantly responded to the interaction between organic manure levels and varieties during 2nd cut and 5th cut in the 1st season but it was the 5th cut in the 2nd season.

2– Fresh forage yield (ton /fed) during winter seasons: -

- Effect of organic manure levels (A):-

Averages in table (2) indicated that applying organic manure fertilizer at levels 20, 40 and 60 m^3/fed had no significant effect on fresh forage yield (ton /fed) during the two growing seasons. Similar trend were observed by **El–Shesheny (1999), Rizk *et al* (2000 a).**

- Effect of varieties (B):-

Table (2) show that varieties had no significant effect on fresh forage yield, during the winter growing seasons with one exceptions in the 3rd cut during the 2nd season.

- Effect of the interaction between (A * B) :-

The data in Table (2) indicate clearly that the fresh forage yield were significantly responded to the interaction between organic manure levels and varieties. The significant values were observed during 3rd, 4th and 5th cuts in the 1st season. Whereas it was significant during 3rd and 4th cuts un the 2nd season.

3– Dry forage yield (ton/ fed) during Summer seasons: -

- Effect of organic manure levels (A): -

The data in table (3) show that increasing organic manure levels from 20, 40 to 60 m^3/fed did not affect significantly on dry forage yield during the two growing seasons except the 2nd cut in the 2nd season. This may be due to the soil fertility and this was expected since the fresh forage yield was in the same trend. These results are in harmony with those obtained by **Rizk *et al* (2000 a), Rizk *et al* (2000 b).**

Effect of varieties (B):-

The data in table (3) indicate clearly that the dry forage yield did not significantly respond to varieties except the 2nd cut in the 1st season. This may be due to the interaction between genetic construction did not respond to environmental conditions.

Table 1

Table 2

- Effect of the interaction between (A* B):

The data in table (3) indicate clearly that the dry forage yield were significantly responded to the interaction between organic manure levels and varieties during 2nd and 5th cuts in the 1st season. And during the 2nd, 4th and 5th cuts in the 2nd season.

4– Dry forage yield (ton/fed) during winter seasons: -

- Effect of organic manure levels (A) : -

The data in table (4) show that applying organic manure at levels 20, 40 and 60 m^3 /fed had no significant effect on dry forage yield. It can be concluded that 20 m^3 /fed was sufficient level. These results are in harmony with those obtained by **Rizk *et al* (2000 a), Rizk *et al* (2000 b).**

- Effect of alfalfa varieties (B):-

Average of dry forage yield of alfalfa in table (4) indicate clearly that dry forage yield did not respond to the genetic differences between the two varieties during the two successive seasons with one exception in the 3rd cut during 2nd season.

- Effect of the interaction between (A * B): -

The data in table (4) indicate clearly that the dry forage yield were significantly responded to the interaction between organic manure levels and varieties, during the 3rd, 4th and 5th cuts in the 1st season. Whereas the significant level were during 2nd, 3rd and 4th cuts in the 2nd season.

5– Crude protein % in summer seasons:-

- Effect of organic manure levels (A) : -

The data in table (5) indicate clearly that the protein percentage was significantly responded to organic manure levels. The maximum values were observed by applying 60 m^3 /fed, during 1st, 2nd, 3rd and 5th cuts in the 1st season. Whereas it was significant during the 2nd and 3rd cuts in the 2nd season, respectively. This may be due to that increasing organic manure levels increased nitrogen compounds in plants. These results are in harmony with those obtained by **El–Morsy (1998), El–Shesheny (1999).**

- Effect of varieties (B):-

Results in table (5) show that the varieties response differently under this trait, during all cuts in the two growing seasons.

- Effect of the interaction between (A * B) : -

The data in table (5) indicate clearly that the protein percentage was significantly responded to the interaction between organic manure levels and varieties. The maximum values were observed by applying 60 m^3 /fed, organic manure levels and V1 for protein percentages except during 3rd cut in the 1st season. And during 3rd and 4th cuts in the 2nd season. This significant interaction means that the protein percentage response differently under the two factors .

6– Crude protein % in winter seasons :-

- Effect of organic manure levels (A) :-

The data in table (6) indicate clearly that increasing organic manure levels increased protein percentage during the two growing seasons. During 1st, 3rd and 4th cuts in the 1st season. And during the 2nd and 5th cuts in the 2nd season. This means that increasing organic manure levels increased the nitrogen compounds in plants. These results are in harmony with those obtained in summer season. Similar trend were obtained by **El–Morsy (1998), El–Shesheny (1999).**

Table 3

Table 4

Table 5

Effect of varieties (B):-

The data in table (6) indicate clearly that the protein percentage was significantly responded to the varieties during all cuts in the two growing winter seasons.

- Effect of the interaction between (A * B):-

Averages in table (6) indicate clearly that the protein percentage was significantly responded to the interaction between organic manure levels and varieties. The maximum values were observed by applying 60 m^3 / fed and V1 with one exception during 2^{nd} cut in the 1^{st} season and 2^{nd} cut in the 2^{nd} season. This significant interaction means that the protein percentage response differently under the two factors .

7– Total carbohydrates % in summer seasons :-

- Effect of organic manure levels (A) :-

The data in table (7) show that increasing organic manure levels from 20 or 40 to 60 m^3 / fed, affected significantly on total carbohydrates percentage during the 1^{st}, 2^{nd} and 3^{rd} cuts in the two growing seasons. This results is in agreement with **El–Morsy (1998), El–Shesheny (1999).**

- Effect of varieties (B):-

Data on total carbohydrates % are shown in table (7). Total carbohydrates % was affected significantly by varieties during all cuts in the two growing seasons.

- Effect of the interaction between (A * B):-

The data in table (7) indicate clearly that the total carbohydrates % were significantly responded to the interaction between organic manure levels and varieties. The maximum values were observed by applying 40 m^3 /fed and V1 except during 3^{rd} and 5^{th} cuts in the 1^{st} season and 2^{nd} cut in the 2^{nd} season. This significant interaction means that the total carbohydrates % response differently under the two factors.

8– Total carbohydrates % in winter seasons:-

- Effect of organic manure levels (A):-

The data in table (8) indicate clearly that the total carbohydrates % was significantly responded to the organic manure levels during 1^{st} and 3^{rd} cuts in the 1^{st} season. And during 1^{st}, 2^{nd}, 3^{rd} and 4^{th} cuts in the 2^{nd} season. These results are in harmony with those obtained by **El–Morsy (1998), El–Shesheny (1999).**

- Effect of varieties (B):-

Results in table (8) show that the varieties caused significant differences in all cuts during both growing seasons .

- Effect of the interaction between (A * B):-

The data in table (8) indicate clearly that the total carbohydrates percentage were significantly responded to the interaction between organic manure levels and varieties. The maximum values were observed by applying 40 m^3/fed and V1 with one exception during the 3^{rd} cut in the 1^{st} season and 2^{nd} cut in the 2^{nd} season.

Table 6

Table 7

Table 8

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تأثير التسميد العضوى ومواعيد الزراعة على محصول العلف وجودته للبرسيم الحجازى بمحافظة الفيوم

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أقيمت تجربتين حقليتان بمزرعة الكلية – جامعة الفيوم خلال الموسمين الزراعيين ٢٠٠٦، ٢٠٠٧م. وذلك لدراسة تأثير اضافة ثلاثة معدلات من السماد العضوى وهى ٢٠ ، ٤٠ ، ٦٠ متر مكعب للفدان على نمو ومحصول صنفين من البرسيم الحجازى وهما [سى ريفر (الصنف الأول) – الوادى الجديد (الصنف الثانى)] وذلك عند زراعتهما خلال موعدين مختلفين (صيفى فى أبريل، شتوى فى نوفمبر)

وقد تم حش القطعة التجريبية بالكامل عند ميعاد كل حشة وذلك لتقدير المحصول العلفى الغض للقطعة التجريبية وحساب المحصول بالطن للفدان وكذلك أخذت عينات تقدر بـ ٢٠٠ جرام من كل قطعة تجريبية تم تجفيفها لحساب المحصول الكلى الجاف فى كل حشة. ثم تم تقدير القيمة الغذائية وذلك عن طريق التحليل الكيماوى.

أهم النتائــج:

أ – المحصول العلفى :

١ – محصول العلف الغض (طن/فدان):

لم يكن هنـاك تـأثير معنـوى للمستويات المختلفـة من التسميد العضـوى علـى المحصـول العلفـى الغض (طن /فدان) فى كلا الموسمين الصيفى والشتوى عدا الحشة الثانية فى الموسم الثانى فقط وذلك فى الزراعة الصيفية .

٢ – محصول العلف الجاف (طن/فدان):

لم يكن هنـاك تـأثير معنـوى للمستويات المختلفـة من التسميد العضـوى علـى المحصـول العلفـى الجاف (طن/فدان) فى كلا الموسمين الصيفى والشتوى عدا الحشة الثانية فى الموسم الثـانى فقط وذلك فى الزراعة الصيفية.

ب– المحتوى الكيماوى:

١ – نسبة البروتين:

أدت زيادة معدلات التسميد العضوى الى زيادة نسبة البروتين حتى ٦٠ متر مكعب/فدان وذلك فى الحشات الأولى والثانية والثالثة والخامسة فى الموسم الأول وفى الحشة الثانية والثالثة فى الموسم الثانى وذلك فى الزراعة الصيفية، بينما كانت هذه الزيادة فى الزراعة الشتوية فى الحشات الأولى والثالثة والرابعة فى الموسم الأول والحشات الثانية والخامسة فى الموسم الثانى.

٢ – نسبة الكربوهيدرات الكلية:

أدت زيـادة معـدلات التسـميد العضـوى الـى زيـادة نسـبة الكربوهيـدرات الكليـة حتـى ٦٠ متـر مكعب/فدان وذلك فى الحشات الأولى والثانية والثالثة فى كلا الموسمين وذلك فى الزراعـة الصيفية، بينما كانت فى الزراعة الشتوية فى الحشات الأولى والثالثة فى الموسم الأول والحشات الأولى والثانية والثالثة والرابعة فى الموسم الثانى.