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# Response of forage mass to cutting date and forage mixtures ratios

# استجابة الكتلة العلفية لمواعيد القطع (الحش) و نسب الخلط العلفية

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## ABSTRACT

The experiment was conducted during winter of the season 2012-2013 in one of fields of (Mahaweel / Bada`a Kabeer) north city center of Babel , to investigate the response of Forage mass to dates of cutting and ratios of forage mixtures(barley+barseem), A factorial arrangement in randomized complete block design in split plot arrangement with three replication was used , In main plots was cutting dates : $T_1$ (50 days after planting) , $T_2$ (60 days after planting) and $T_3$ (70 days after planting) , sub plots was forage mixtures ratios : $D_1$(barley 1 : 1 clover) , $D_2$(barley 1 : 2 clover) and $D_3$(barley 1 : 3 clover) .

. the studied traits was : number of leaves /$m^2$ , cover leaves ($m^2$ / ha) , net asdsimilation rate (g/$cm^2$/week) , leaves per stems (%) , green forage yield (tan/ha) , dry forage yield (tan/ha) , percentage of Protein (%) and protein yield (tan/ha) ; The treatment third date ( $T_3$ ) was superior in number leaf /$m^2$ , leaves cover, net asdsimilation rate , leaves per stems , green forage yield , dry matter yield , percentage of protein and protein yield . The treatment forage mixtures ratios ($D_2$) was superior in net asdsimilation rate , green forage yield and dry mater yield while treatment ($D_3$) was superior in No. leaf/$m^2$ , leaves cover , percentage of protein and protein yield ; A linear relationship was found between cutting dates with forage mixtures ratios in yield traits was found in treatment ($D_3 \times T_3$) and ($D_2 \times T_3$) , So the treatment ($D_3 \times T_3$) was superior in number leaf/$m^2$ , leaves cover , percentage of protein and protein yield ; The treatment ($D_2 \times T_3$) was superior in net asdsimilation rate , leaves per Stems , green forage yield , dry mater yield .

**الخلاصة :**

أجريت هذه التجربة الحقلية خلال الموسم الشتوي 2012-2013 في احدى الحقول الزراعية (البدع الكبير - قضاء المحاويل) شمال مركز مدينة محافظة بابل (40 كم) ,بهدف دراسة استجابة الشعير مع البرسيم للزراعة المتداخلة و لمواعيد الحش ونسب المخاليط العلفية , استخدم في تنفيذ التجربة تصميم القطاعات العشوائية ضمن ترتيب الالواح المنشقة وبثلاث مكررات اذ شملت الألواح الرئيسية مواعيد الحش والألواح الثانوية نسب المخاليط العلفية ، وكانت الصفات المدروسة :

(عدد الاوراق\م$^2$ – الغطاء الورقي م$^2$\هكتار –معدل صافي تمثيل الضوئي غم\سم$^2$\اسبوع –نسبة الاوراق الى السيقان (%) – حاصل العلف الاخضر طن\هكتار- حاصل مادة جافة طن\هكتار –النسبة المئوية للبروتين (%) – حاصل البروتين طن/هكتار ، تم الحصول على النتائج التالية :

تفوق الموعد ثالث ( $T_3$ ) في كل من عدد الاوراق/م$^2$ والغطاء الورقي ومعدل صافي التمثيل الضوئي ونسبة الاوراق الى السيقان وحاصل العلف الاخضر وحاصل المادة الجاف والنسبة المئوية للبروتين وحاصل البروتين ، في نسب المخاليط العلفية تفوقت نسبة الخلط العلفية ($D_2$) في كل من معدل الصافي التمثيل الضوئي وحاصل العلف الاخضر وحاصل المادة الجافة ، بينما تفوقت نسبة الخلط العلفية ($D_3$) في كل من عدد الاوراق/م$^2$ والغطاء الورقي والنسبة المئوية للبروتين وحاصل البروتين ، تفوق التداخل ($T_3 \times D_3$) في كل من صفة عدد الاوراق/م$^2$ والغطاء الورقي والنسبة المئوية للبروتين وحاصل البروتين بينما اظهر التداخل ($T_3 \times D_2$) في كل من معدل الصافي التمثيل ونسبة الاوراق الى السيقان حاصل العلف الاخضر وحاصل المادة الجافة .

## INTRODUCTION

Livestock have operated important place and essential in stable agricultural system because of its active role in achieving food security , The decline in productivity forage , limited forage resources , inability to meet food needs necessary and sufficient for the animals as well as higher prices is one of the problems that stand in front of the evolution , development of these wealth and cover the current deficit in animal products due to of growing demand. Forage mixtures is a concept had known human since more than 4000 years BC. , for the purpose of increasing nutritional value of yield forage and easily submission of the animal , Forage mixtures is known as feeds consisting of two crops or more are often planted randomly either single or intercropping, the competition in this case are among crops on environmental factors and soil factors, the intercropping among plants determines the optimal use of growth conditions and thus affect the amount of vegetative growth and nutritional value of forage (2),(1).

Forage mixtures consisting of crops (cereal-legume) are important source of energy to the contain of protein, carbohydrate and mineral elements, In the forage mixture, The Cereal component is a source of carbohydrate and legume source compo- nent provides proteins in forage (3). Nutritionally balanced forage is obtained from mixtures of leguminous and grassy forage had been mainly motive to plant forage mixtures.

Trifolium alexandreum L. is one of important forage crops leguminous in most countries in world, So it is a source of protein and carbohydrates in food animal, because of high proportion of protein and low fiber in vegetative parts, So it is longer foraging perfect food integrated to livestock therefore we make increase the density of the crop legumes in the mixture gives an

increase yield protein in forage mixture (4).

Increase in rates of intensities legume crop may face several problems, including the nutrition leguminous forage cause bloat to animals (5) , So we resort to provide forage mixtures as balanced proportions shall give the highest protein yield in order to avoid bloat problem , Planting clover loaded with barley have faced several problems, including rapid vegetative growth of barley therefore it caused poor vegetative growth of clover (6) , So we try to find a solution by knowing the cutting date and plant densities in balanced proportions.

Hordeum spp. is one of strong cereal fields which give big forage yield (qualitative and quantitive) , So it's giving carbohydrate to forage mass(7),the competing among different plant is one of important factors which limit growth plant (8), although the will to increase protein in forage mass by increase legume forage to cereal forage , So we should advertence to per cereal plant in forage mass by effect on its growth (9) .

The best cutting date have effected in growth plant species in forage mass which become slow growth because of competitiveness(10) , (11) . losing time, cutting date in intercropping may be not giving increase in forage yield (12) .

So we conducted this experiment to study many per of forage mixture with best cutting date which give the best forage yield (qualitative and quantitive).

## METHODS AND MATERIALS

The experiment was conducted during winter season 2012-2013 in one of (Mahaweel / Bada`a Kabeer) fields – north Babel city , The experiment was carried out as a split-plot design based on Randomized Complete Block Design with three replications , In main plots was cutting dates : $T_1$ (50 days after planting) , $T_2$ (60 days after planting) and $T_3$ (70 days after planting) , sub plots was forage mixtures ratios : $D_1$(barley 1 : 1 clover) , $D_2$(barley 1 : 2 clover) and $D_3$(barley 1 : 3 clover) .

Analysis of variance(ANOVA) and means comparison was carried out by L.S.D. test under incorporeity level 5% (13) with S.A.S. program (14) .

Treatments was randomized distributed in $(8\times3)m^2$ plot , distance among sub-plots 0.5 m and lines 20 cm (15) ,time of planting 10/11/2012 (16), The cultivars for studying was (mascawi) clover and (warka) barley , Cutting of plants was at least 50 cm height (10) , (11) . N fertilizer added as

Urea (46%) in rate (20 kg N/ h)on two defrayments :first at planting stage , second after 40 days from first (17) , Studies traits was :

Number of leaves /$m^2$, cover leaves ($m^2$ / ha) (plant leaf area ×plant density) , net asdsimilation rate (g/$cm^2$/week) , leaves per stems (%) , green forage yield (tan/ha) , dry forage yield (tan/ha) , percentage of Protein to dry weight (%)(kjldal method) and protein yield (tan/ha) .

Soil of the field was checking to know (physical and chemical traits) in Soil department laboratories /collage of agriculture , The result was in table (1) :

table (1) physical and chemical analysis for soil before planting :

| Studies traits | Rate |
|---|---|
| (PH) | 7.8 |
| (Ec) | 3.1 |
| Sand(%) | 30.5 |
| Clay(%) | 38.4 |
| Silt(%) | 29.8 |
| Contexture | Admixture Clay |

## RESULTS AND DISSCUSION

Cutting date was given differences incorporeity in yield traits table (2) , treatment third date ( $T_3$ ) was superior in No. leaf /$m^2$ ( 1020.7 ), leaves cover (28751.8 $m^2$/ha) , net asdsimilation rate (39.9g/$cm^2$ /week) , leaves per stems (102.2 %) , green forage yield (12.078 tan/ha) , dry matter yield (1.495 tan/ha) , Per. of protein (43.6%) and protein yield (5.249 tan/ha) , this data agree with (11), (15) who found the best stage for cutting after 70 days from date of planting that give best forage traits , make plant cutting in late will give increase in plant vegetable growth in to leaf area , number of leaves and accumulation of dry matter consequently increase protein in plant parts.

Forage mixtures ratios was too given differences incorporeity in yield traits table(2) , treatment ($D_2$) was superior in net asdsimilation rate (38.4 g/$cm^2$/week) , green forage yield (11.911 tan/ha) , dry mater yield ( 1.667 tan/ha) This data is agree with (8) who found best plant density between barley and clover (1:2) to give best quality and quantity green yield traits , So falling in plant competition among species on growth factors ; Treatment ($D_3$) was superior in No. leaf/$m^2$ (978.9) , leaves cover (25863.3 $m^2$/ha) , per. of protein (44.9%) and protein yield (4.870 tan/ha) , it is found because increase plant density in area unit.

The interaction table(2) between cutting dates with forage mixtures ratios in yield traits was found in treatment ($D_3 \times T_3$) and ($D_2 \times T_3$) , So the treatment ($D_3 \times T_3$) was superior in No. leaf/$m^2$ (1024.9) , leaves cover (28792.4 $m^2$/ha) , Per. of protein (48.6 %) and protein yield (5.674 tan/ha) ; The treatment ($D_2 \times T_3$) was superior in net asdsimilation rate (40.83 g/$cm^2$/week) , leaves per Stems (105.9 %) , green forage yield (12.633 tan/ha) , dry mater yield ( 1.768 tan/ha).

Table(2) Effect Cutting Date and Forage Mixtures Ratios on Forage Mass

| Treatment | No. leaf /$m^2$ | leaves cover $m^2$/ha | net asdsimil-ation rate g/$cm^2$/week | leaves per stems (%) | green forage yield (tan/ha) | dry matter yield (tan/ha) | Per. of protein (%) | protein yield (tan/ha) |
|---|---|---|---|---|---|---|---|---|
| Cutting Date | | | | | | | | |
| $T_1$= 50 days | 854.9 | 19914.0 | 31.3 | 71.8 | 10.022 | 1.242 | 36.2 | 3.619 |
| $T_2$= 60 days | 981.9 | 28544.5 | 38.7 | 95.2 | 11.733 | 1.453 | 42.4 | 4.949 |
| $T_3$= 70 days | 1020.7 | 28751.8 | 39.9 | 102.2 | 12.078 | 1.495 | 43.6 | 5.249 |
| L.S.D | 87.71 | 193.1 | 3.75 | 12.57 | 0.479 | 0.048 | 2.19 | 0.221 |
| Forage mixtures ratios | | | | | | | | |
| $D_1$=1:1 | 923.5 | 25551.3 | 34.6 | 86.02 | 11.189 | 1.343 | 34.8 | 4.163 |
| $D_2$=1:2 | 955.8 | 25795.6 | 38.4 | 93.3 | 11.911 | 1.667 | 42.5 | 4.783 |
| $D_3$=1:3 | 978.9 | 25863.3 | 36.9 | 89.9 | 10.733 | 1.180 | 44.9 | 4.870 |
| L.S.D | 25.18 | 136.0 | 1.49 | N.S | 0.303 | 0.037 | 1.09 | 0.223 |
| Interaction | | | | | | | | |
| $T_1$ $D_1$ | 799.9 | 19487.3 | 28.8 | 69.2 | 10.000 | 1.200 | 32.4 | 3.454 |
| $D_2$ | 857.7 | 20094.1 | 33.9 | 74.9 | 10.667 | 1.493 | 37.9 | 3.796 |
| $D_3$ | 907.1 | 20160.6 | 31.3 | 71.3 | 9.400 | 1.034 | 38.3 | 3.606 |
| $T_2$ $D_1$ | 955.3 | 28458.1 | 36.5 | 89.5 | 11.633 | 1.396 | 35.2 | 4.372 |
| $D_2$ | 985.8 | 28538.3 | 40.4 | 99.1 | 12.433 | 1.740 | 44.2 | 5.145 |
| $D_3$ | 1004.7 | 28637.0 | 39.2 | 97.0 | 11.133 | 1.223 | 47.9 | 5.330 |
| $T_3$ $D_1$ | 1015.2 | 28708.5 | 38.77 | 99.3 | 11.933 | 1.432 | 36.9 | 4.663 |
| $D_2$ | 1022.2 | 28754.5 | 40.83 | 105.9 | 12.633 | 1.768 | 45.3 | 5.409 |
| $D_3$ | 1024.9 | 28792.4 | 40.33 | 101.2 | 11.667 | 1.283 | 48.6 | 5.674 |
| L.S.D | 99.94 | 240.0 | 9.02 | 22.8 | 1.439 | 0.154 | 4.34 | 0.351 |

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