The Effect of Cutting on Yield and its Components of four varieties of Barley under Duhok governorate conditions.

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Abstract

This study was conducted at the field of the College of Agriculture Dohuk University during the seasons of ٢٠٠٦-٢٠٠٧ and ٢٠٠٧-٢٠٠٨. Four varieties of barley were used in this study (local black, IPA ٩٩, triticale and Malta ١١٠٥). The treatments were arranged in factorial experiment (٤x٣) using randomized complete block design with four replications. One cut and two cut were preformed for the midlines of each treatment. The data were recorded on ten randomly selected plants. The results showed superiority of non cut treatment. The interaction between the cut and non cut the IPA ٩٩ was superior to the rest of the varieties, where it was less affected by the cut than the rest of the varieties, followed by Malta ١١٠٥. As for the green fodder, the two cut treatment was superior to the one cut treatment. The cut was led to increasing the number of tillers. IPA ٩٩ was the most tolerant variety to the cut as compared with the other varieties followed by Malta ١١٠٥ for both season. As for the straw yield , the local black was superior in the two cut treatment, whereas IPA ٩٩ was superior in both (non cut and one cut treatments) . It can be concluded that IPA ٩٩ can take one cut and could be used to produce cereals yield.

Introduction

The problem of the green fodder is regarded as one of the major problems challenging the animal wealth in Iraq, particularly during the recent years. Hence, it has become necessary to prepare special genotypes for producing green fodder in the preliminary stages of their growth along with retaining a high capability of producing the cereals after the cutting. The yield components involving the number of tillers for the unit of area, number of seeds/spike and ١٠٠٠ kernels weight are considered among the important morphological variables which can affect the cereals yield and its improvement such as wheat, barley and triticale (Dashora et al.: ١٩٧٧, McNeal et al.: ١٩٧٨, Puri et al.: ١٩٨٢). It is worth noting that the toleration of some fodder crops to the cutting while keeping a high productivity of cereals is related to the genotype (Dumphy et al.: ١٩٨٢, Mohammed: ١٩٩٠ and Roy and Tribb: ١٩٩٧). Studies varied about the effect of the varieties and the cutting on the production of cereals and fodder according to the varied genotypes and environment (Hadjchristodoulou: ١٩٨٦, Droushotis and Wilman: ١٩٨٧ and Al-Hasan: ١٩٩٥).

Some researchers pointed out that both variety and cutting were given negatively affect the productivity of green fodder and cereals yield (Morill: ١٩٧٣, Yau: ٢٠٠٣, Al-

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Hasan: ١٩٩٥ and Al-Hasan: ٢٠٠٨); whereas (Washko: ١٩٤٧, Al-Rawi and Shamma: ١٩٩١, Shamm et al.: ١٩٩٣ and Royo: ١٩٩٩) noted that cutting does not have negative effect on the cereal yield when studying the barley group-Base ٢٦٤. The study aims to realize the range of effect of cutting, non-cutting and varieties on the productivity of green fodder as well as the yield and its components under Duhok governorate conditions.

Materials and Methods

The study was carried out at the field of the College of Agriculture / Dohuk University during ٢٠٠٦-٢٠٠٧ and ٢٠٠٧-٢٠٠٨ seasons. Four varieties of barely were used in this study , (local black, IPA

٩٩ and Malta ١١٠٥) and three levels of cutting (non, one, and two) for each variety the experiment was designed according to randomized completed block design with four replications.

Each experimental unit contained four lines of ٥ m length. Distance between lines was ٢٠ cm. The plants were cut over two stages: the first was at the end of the tillers, and the second was at the beginning of nodes stage. The date of planting was during the second half of November, and the harvest was at the end of May. Rainfall amount were recorded during the two planting season (Table ١).

Complementary irrigation was used in ٢٠٠٧ – ٢٠٠٨ twice the first in November and second in May. Characteristics were studied by selecting ١٠ plants and only from the middle lines, for plant height /cm., number of spikes/m٢, number of tillers/plant, number of kernels/spike, ١٠٠٠ kernels weight/gm., cereals yield/kg./m٢, green fodder/Kg/D and straw/Kg./m٢. Statistical analysis was done according to RCBD and comparison among means was done by using Dunca'n's Multiple Range test (Al-Rawi and Khalaf Allah, ١٩٨٠).

Table (١) the rainfall (mm٣) during season ٢٠٠٦-٢٠٠٧ and ٢٠٠٧-٢٠٠٨ Duhok Agriculture-college station.

٢٠٠٦-٢٠٠٧

October	November	December	January	February	March	April	May	Average
١٨,٥	٧٣,٤	--	٥٩,٦	٥٦,٠	٥٥,٩	٧٠,٨	١٦,٠	٥٠,٠٣

٢٠٠٧-٢٠٠٨

October	November	December	January	February	March	April	May	Average
---	٣,٥	٢,١	٥٩,٤	٤٨,١	٢٢,٢	١,٥	---	١٧,١

Results and Discussions

Plant height (cm.): The findings of the statistical analysis showed highly significant differences between cutting treatments, varieties and their interaction for the two season (Table ٢) where the plant height in non-cutting treatment was ١٠٥,٥٨ cm,

Where it was ٩٢,٢٧ and ٥٨,٠٥ cm in the two treatments of cutting for season ٢٠٠٦-٢٠٠٧.

The trand in performance of this character was similar in season ٢٠٠٧-٢٠٠٨ (Table ٣). As for the interaction between cutting treatment with seasons and varieties. (Table ٤) shows that IPA ٩٩ surpass the rest varieties used in the study, where its height was ١١٦,١٢ cm. in the non-cutting treatment and (١٠٥,٣٠ and ٦٤.٤٠) cm. in the two cutting treatments for season ٢٠٠٦-٢٠٠٧, respectively at the same time, the triticale ١٣١was surpass to the rest of barley varieties of ٢٠٠٧-٢٠٠٨ season where its height was ٨٩,٠٠ cm. in the non-cutting treatment and (٨٤,٦٦ and ٧٣,٣٣) cm. in the two cutting treatments.

These results were similar to Dashora et al. (١٩٧٧), McNeal et al. (١٩٧٨), Puri et al. (١٩٨٢) and Goodhied (١٩٩٧) concluded.

Table: (٣) Effect of the interaction between seasons, cutting and non cutting on study traits.

Treatments	Plant height/ cm	No. of spike/ m٢	No. of kernels/ spike	Weight of ١٠٠٠ kernels /gm	No. of tillers/ plant	Yield kernels g/m٢	Yield of straw g/m٢	Forage yield Kg./m٢
٢٠٠٦-٢٠٠٧								
Non cutting	١٠٥,٥٨ a	٢٥٣,٣٣ a	٣٤,٧٧ a	٣٨,٤٠ a	٦,٤٤ a	٠,٦٦٨ a	٠.٩٤٣ a	---
One cutting	٩٢,٢٧ b	٢٣٧,١٦ ab	٣٣,٤٧ ab	٣٦,٨٨ b	٥,٧٤ b	٠,٥٩٧ b	١,٠٤٤ a	٩٧٩,٦٩ a
Two cutting	٥٨,٠٥ c	٢٦٦,٩١ b	٣٠,٣٢ b	٣٥,٧٢ c	٥,٦٥ b	٠,٥٠١ b	٠,٧٣٣ c	١٤٩٨,٨٧ b
٢٠٠٧-٢٠٠٨								
Non cutting	٧٧,٦٦ a	٢٤١,٣٣ a	٣٢,٦١ ab	٣٦,١٨ a	٦,٤٩ ab	٠,٦٠٢ a	٠,٩١٨ a	---
One cutting	٦٨,٥٨	٢٢٣,٩١	٣٥,٣٣	٣٣,٧٠	٧,٢٢	٠,٥٣٥	٠,٧٣٣	٩٠٥,٣٣

	b	ab	a	b	a	b	b	b
Two cutting	٦٢,٠٨	١٧٠,٦٦	٢٩,٥١	٣٢,١١	٥,١١	٠,٤٣٣	٠,٧١٥	٢٢٤٧,٨٣
	c	b	c	c	c	c	b	a

Number of Kernels/Spike

The results showed that mean square for this character was highly significant for cutting treatments and varieties and their interaction in the two season (Table ٢). Cutting treatments showed ٣٤,٧٧ kernels/spike and this number reduced in one and two cuttings where it was ٣٣,٤٧ and ٣٠,٣٢ respectively in season ٢٠٠٦-٢٠٠٧.

In season ٢٠٠٧-٢٠٠٨, On the other hand, the number of kernels/spike in the one-cutting treatment was ٣٥,٣٣, followed by ٣٢,٦١ in the non-cutting treatment.

The two cutting treatments exhibited lower number of seeds ٢٩,٥; and this shows that the one-cutting has increased the number of tillers in square meter (Table ٣).

As for the interaction between the cutting treatments and varieties. (Table ٤) showed that the Triticale ١٣١ was superior over the rest of barley varieties in the non-cutting treatment, whereas IPA: ٩٩ was superior in the one and two cutting treatments in season ٢٠٠٦-٢٠٠٧.

In season ٢٠٠٧-٢٠٠٨, IPA ٩٩ barley was superior to the rest of varieties in all treatments and varieties of cutting.

Number of spikes/m٢

The statistical analysis showed mean square of cutting treatments was significant (Table ٢) where the non-cutting treatment was superior in the number of spikes/m٢ as compared with two-cutting treatments for both seasons, where it reached to ٢٥٣,٣٣ in season ٢٠٠٦-٢٠٠٧ and ٢٤١,٣٣ in ٢٠٠٧-٢٠٠٨ (Table ٣). This can be attributed to the amount of the rainfall during the growth season (Goodchied: ١٩٩٧).

(Table ٤) shows the means of cutting treatments and varieties, where in season ٢٠٠٦-٢٠٠٧, black barley was superior to the rest of varieties with non-cutting treatment. IPA ٩٩ barely was superior with the one-cutting treatment and the local black barley was superior to the rest of varieties in two-cutting treatment.

The varieties followed the same way in season ٢٠٠٧-٢٠٠٨ Mohammed (١٩٩٠) obtained similar results in the Spa town area.

Weight of ١٠٠٠ Kernels /gm.

The statistic analysis shows significant mean square for cutting treatments for both seasons (Table ٢). The non-cutting treatment was surpassing to the reminder, where it was ٣٨,٤٠ gm, in season ٢٠٠٦-٢٠٠٧ and ٣٦,١٨ in ٢٠٠٧-٢٠٠٨.

The cut had an obvious effect on the weight of ١٠٠٠ kernels, particularly in the two-cutting treatment (Table ٣). Dunphx et al. (١٩٨٢) referred to a reduction in the weight of ١٠٠٠ kernels/gm which could attributed to the fact that the plants had no enough chance to be filled with kernels.

Whereas it was ٣٤,٠٠/gm in ٢٠٠٧-٢٠٠٨. The interaction between cutting treatment and varieties seasons, (Table ٤) showed that IPA ٩٩ surpass with other varieties and in all the treatments (cutting and non-cutting) in season ٢٠٠٦-٢٠٠٧.

On other hand, on season ٢٠٠٧-٢٠٠٨, the IPA ٩٩ barley was also surpass other varieties and in all the treatments, followed by Malta barley which had no significant difference IPA ٩٩ barley; and this agrees with what Hadjichristodiubu (١٩٨٦), Drashiot is and Wilman (١٩٨٧), Mohammed (١٩٩٠) and Al-Hasan (١٩٩٥) .

Number of tillers/plant

The statistical analysis showed that mean square for cutting treatment varieties and their interaction was highly significant in the two seasons (Table ٢). The non-cut treatment surpass one and

two-cut treatments, in ٢٠٠٦-٢٠٠٧ the one-cut treatment surpass the non-cut and two-cut treatments where the number of tillers was ٧,٢٢ (Table ٣).

(Table ٤) showed local black barley was superior to the rest of varieties in both non-cut and one-cut treatments for the two seasons, whereas IPA ٩٩ barley was superior to the rest of varieties in the two-cut treatment, followed by Malta barley ١١٠٥.

Cereals Yield: Kg./m٢

The statistical analysis showed highly significant mean square for cutting treatment, varieties and their interaction in the two seasons (Table ٢). Since the non-cut treatment was superior to the two cut treatments in the cereal yield, this is attributed to the fact that the cut (one and two) has affected the cereal outcome (Table ٣); and this agrees with what has been recorded by Morill (١٩٧٣), Yau. S-K (٢٠٠٣) and Hasan (٢٠٠٤).

(Table ٤) shows the effect of interaction between cutting treatment and varieties, where IPA ٩٩ barley was superior to all of the treatments (non-cut and cut) and for both seasons, followed by Malta ١١٠٥ barley and the local black barley, this also similar to what Al-Rawi and Shamma (١٩٩١) and Shamma et al. (١٩٩٣) referred to when they studied hereditary groups of barley ٢٦٤ Basc

Yield green fodder Kg./D.

Depending on the findings of the statistical analysis, it was showed that mean square for cutting treatments, varieties and their interaction was highly significant for this character in the two seasons (Table ٢). In ٢٠٠٦-٢٠٠٧ the two-cut treatment was superior to the one-cut where the green fodder outcome was ١٤٨٨,٨٧ kg./D.

The above mentioned treatment followed the same trend in season ٢٠٠٧-٢٠٠٨ where the weight was ٢٢٤٧,٨٣ Kg./D. This could be attributed to the increase the number of tillers after the first cut (Table ٣).

(Table ٤) showed the interaction between cutting treatment and varieties, where the IPA ٩٩ barley was superior to the rest of the varieties in the one-cut and the two-cut treatments followed by Malta ١١٠٥ barley and for both seasons.

Straw yield kg./m٢

Table (٣) showed the mean square of cutting treatments for two season, where in season ٢٠٠٦-٢٠٠٧ the one-cut treatment was superior in the straw yield to the two-cut treatment and the difference with the non-cut treatment was not significant.

In season ٢٠٠٧-٢٠٠٨ the non-cut treatment was superior to both one-cut and two-cut treatments, and that the difference between the one-cut and two-cut in the straw field was not significant.

As for the interaction effect of the cutting treatments with varieties, the IPA ٩٩ barley was superior to the rest of varieties in the non-cut and the one-cut treatments, whereas the local black barely was superior in the two-cut treatment in season ٢٠٠٦-٢٠٠٧. On the other hand, in season ٢٠٠٧-٢٠٠٨, the local black barely was superior to the rest of treatments non-cut and cut to the rest of the varieties (Table ٤).

Table (٤):ffect the interaction between cutting, non cutting, seasons and arieties on study traits.

cutting	Varieties	Plant height/ cm	No. of kernels/ spike	No. of spike/ m٢	Weight of ١٠٠٠ kernels /gm	No. of tillers/ plant	Yield kernels g/m٢	Yield straw g/m٢	Forage yield Kg./m٢
٢٠٠٦-٢٠٠٧									
Non cutting	IPA٩٩	١١٦,١٢ a	٣٩,٢٦ b	٢٦٦,٦٧ b	٤٣,٣٣ a	٧,٥٦ a	٠,٦٤٠ a	١,٣١٠ a	--
	Triticale ١٣١	١٠١,١٠ b	٤٢,٥٠ a	٢٢٠,٠٠ e	٣٦,٠٠ b	٤,٦٨ d	٠,٦٤٠ a	٠,٥٩٠ d	--
	Black barley	٩٧,٠٠ c	١٦,٣٥ e	٢٨٠,٠٠ a	٣٦,٤٦ b	٨,٦٠ a	٠,٦٦٠ abc	١,٠٥٠ a	--
	Malta	١٠٨,١٠	٤١,٠٠	٢٤٦,٦٧	٣٧,٨٣	٦,١١	٠,٦٧٠	١,٠٠٠	--

	barley	b	a	d	b	b	a	a	
One cutting	IPA٩٩	١٠٥,٣٥ b	٤٥,٥٦ a	٢٦٠,٣٣ b	٤٢,٢٠ a	٧,١٣ a	٠,٦٣٠ b	١,٢٥٠ a	١٠٨٦,٨٠ e
	Triticale ١٣١	٨٥,٢٦ d	٣٦,٢٦ cd	١٩٨,٣٣ f	٣٣,٦٦ c	٦,٩٠ b	٠,٥٧٠ c	٠,٩٢٠ b	٨٧٦,٧٠ f
	Black barley	٩٣,٩٣ c	١٥,٠٥ e	٢٥٦,٦٧ c	٣٠,٨٠ a	٧,٩٣ a	٠,٥٩٠ c	١,٢٠٠ a	٩٠٧,٩٠ g
	Malta barley	٨٦,٦٠ c	٣٧,٠١ b	٢٣٣,٣٣ d	٣٥,٨٠ c	٤,٠٠ d	٠,٥٩٠ c	٠,٧٩٠ c	١٠٤٧,٣٠ e
Two cutting	IPA٩٩	٦٤,٤٠ e	٤٠,٦٦ a	٢٠٨,٣٣ e	٤٠,١٦ a	٦,٩٣ b	٠,٥٢٠ d	٠,٨٥٠ b	١٧٢٢,٤٠ a
	Triticale ١٣١	٥٦,٨٠ e	٢٩,٥٠ d	١٩٧,٦٧ f	٣٢,٤٣ c	٤,٣٢ d	٠,٤٥٠ e	٠,٣١٠ f	١٣٣٨,٠٠ d
	Black barley	٦١,٨٠ e	١٣,٦٥ e	٢٧٦,٦٧ a	٣٤,١٨ c	٦,٢٨ b	٠,٥٠٠ f	١,٠٩٠ a	١٤٢٢,٩٠ c
	Malta barley	٤٩,٢٣ f	٣٧,٥٠ b	٢٢٥,٠٠ e	٣٦,١٠ b	٥,٠٨ c	٠,٥١٠ d	٠,٦٧٠ d	١٥١١,٧ b
				٢٠٠٧-٢٠٠٨					
Non cutting	IPA٩٩	٧١,٣٣ c	٤١,٣٠ b	٢٥٨,٦٧ abc	٤٠,٤٣ a	٦,٧٢ c	٠,٦٢٠ a	٠,٩٢٠ b	--
	Triticale	٨٩,٠٠ a	٣٦,٨٧ c	٢١٠,٠٠ de	٣٤,٠٠ de	٤,٠٠ f	٠,٥٧٠ c	٠,٨٠٠ c	--
	Black barley	٦٥,٦٦ d	١٢,٤٦ e	٢٦٠,٠٠ a	٣٤,٢٠ cd	٨,٢٠ a	٠,٦٠٠ b	١,٠٠٠ a	--
	Malta barley	٨٤,٦٦ b	٣٩,٨٣ bc	٢٣٦,٦٧ d	٣٦,١٠ e	٧,٠٦ b	٠,٦١٠ ab	٠,٩٤٠ ab	--
One cutting	IPA٩٩	٦١,٣٣ e	٤٤,٧٣ a	٢٤٥,٠٠ b	٣٨,٥٣ b	٧,١٣ b	٠,٥٧٠ c	٠,٨١٠ c	١٠١٣,٨٠ e
	Triticale ١٣١	٨٤,٦٦ b	٤١,١٦ b	١٨٦,٠٠ f	٣١,٥١ de	٦,٦٠ c	٠,٥١٠ e	٠,٨٠ c	٧٥٠,٣٠ h
	Black barley	٥٣,٣٣ f	١٣,٦٦ e	٢٤٢,٦٧ b	٣١,٨٣ e	٧,٨٠ ab	٠,٥١٠ de	١,٠٣٠ a	٩١٣,٥٠ g
	Malta barley	٧٥,٠٠ c	٤١,٧٦ b	٢٢٢,٠٠ e	٣٢,٩٠ de	٧,٣٦ b	٠,٥٤٠ d	٠,٦٧٠ e	٩٤٣,٨٠ f
Two cutting	IPA٩٩	٧٥,٠٠ c	٣٨,٨٣ c	١٧٨,٦٧ f	٣٧,٣٦ bc	٥,٢٣ d	٠,٤٩٠ f	٠,٧٤٠ d	٢٥٢٣,٤٠ a
	Triticale ١٣١	٧٣,٣٣ c	٣٤,٣٣ d	١٤١,٠٠ g	٢٩,٥٠ f	٣,٢٣ g	٠,٤٠٠ h	٠,٣٦٠ f	١٩٩٧,٢٠ d
	Black barley	٥١,٠٠ f	١٠,٦٦ e	٢١٨,٠٠ e	٣٠,٤٠ e	٥,٢٠ d	٠,٤٥٠ g	١,٠٧٠ a	٢١٧٠,٤٠ c
	Malta barley	٦٧,٠٠ d	٣٤,٢٣ d	١٤٥,٠٠ g	٣١,٢٠ e	٥,٢٠ d	٠,٤٧٠ f	٠,٦٧٠ e	٢٣٠٠,٣٠ b

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تأثير القطع على الحاصل ومكوناته لأربعة أصناف من الشعير تحت ظروف محافظة دهوك

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المستخلص

أجريت الدراسة في محطة أبحاث كلية الزراعة جامعة دهوك وللموسمين (٢٠٠٦-٢٠٠٧) و (٢٠٠٧-٢٠٠٨).
استخدم في التجربة أربعة أصناف من الشعير وهي اسود محلي وآباء ٩٩ وتريتكيلي وشعير مالطا .
وضعت المعاملات في تجربة عامليه (٣ X٤)وبتصميم من القطاعات العشوائية الكاملة وبأربعة مكررات زرع كل تركيب وراثي بأربعة خطوط طول الخط ٥متر والمسافة بين الخطوط ٢٠سم وبكمية بذار ١٦٠ كغم /هـ .
أخذت حشة واحدة وحشتين من الخطوط الوسطية لكل معاملة وأخذت البيانات على عشرة نباتات أخذت بصورة عشوائية .
أظهرت النتائج تفوق المعاملة بدون حش على معاملات الحش (حشة واحدة او حشتين) في حاصل الحبوب ولم يكن للمواسم تأثيرا معنويا على الكثير من الصفات المدروسة اما التداخل بين الحشو وعدم الحش فقد تفوق شعير آباء ٩٩ على بقية الأصناف حيث كان تأثيره بالحش اقل من بقية الأصناف ويلي شعير مالطا اما بالنسبة الى الحاصل علف الاخضر فقد تفوق المعاملة حشتين على المعاملة حشة واحدة وادى الحش الى زيادة عدد التفرعات وكان شعير آباء ٩٩ أكثر الأصناف تحملا للحش بالمقارنة مع بقية الأصناف الأخرى ويليه صنف مالطا ولكلا الموسمين .

اما بالنسبة الى حاصل القش فقد تفوق شعير اسود محلي في معاملة حشتين في حين تفوق اباء ٩٩ في معاملتين عدم الحش وحشة واحدة ومن ذلك يمكن الاستنتاج بان صنف آباء ٩٩ يمكن اخذ منه حشة واحدة وتركه لإعطاء حاصل الحبوب.