EVALUATE DUAL FORAGE AND GRAIN PRODUCTIVITY OF SOME CEREAL WINTER CROPS UNDER DIFFERENT NITROGEN FERTILIZATION LEVELS

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ABSTRACT

This study was designed and implemented to evaluate productivity of three cereal crops *i.e.* Wheat, Barley and Triticale as affected by different nitrogen levels *i.e.* 0, 100 and 200 kg N/fed, two field experiments were carried at Exp. Res. Sta., Fac. Agric., Benha Univ. during 2010/2011 and 2011/2012 seasons. Results indicated significant differences in the total fresh forage yield for each of the three crops under study. Highest fresh and dry forage yield was produced from Barley whereas, the lowest yield was obtained from wheat with significant differences of different magnitudes. Highest grain yield and yield component was recorded from sown triticale and the lowest was recorded from sown Barley with significant differences. It could be concluded that total forage and grain yield as well as yield components were substantially increased as nitrogen fertilization levels increased from 0 to 100 and up to 200kg N/fed, respectively. However, an opposite trend was observed for the No of spikelets/spike and spike length.

INTRODUCTION

In order to satisfy the nutrional requirements of the enormous increase in populations and the feed shortage of the starving domestic animals, there is a drastic need for extra food and feed supply. So, the anticipated dual potentiality of producing the ultimate dual production of the earliest vegetative growth and the grain of high quality is an important concern. In addition, it could be a way of cropping intensification for better return. Wheat, barley and triticale are important cereal crops which contribute in solving the severe lacking of grains and forage production. Enhancing the dual purpose productivity of such crops depending on the applied optimum management practices. Wheat *(Triticum aestivum, L.*) ranks the first among the cereal crops on the basis of productivity. Its vegetative growth is a valuable source of high forage quality where is rich in protein, energy and nutrients (**Hossain *et al.*, 2003**). Wheat crop is planted in about 3 million feddan (4200 m^2), producing 8-9 million tons in Egypt and is still in shortage for food and feed due to the drastic increase in population density. Egyptian consuming about 15 million tons of wheat to overcome such shortage. So, there is an urgent need to increase wheat yield by extending its area of production in horizontal and vertical manner.

Wheat yield and its components increased with N application up to 150 kg N/ha compared with the other applied levels **(Ahmad *et al.* 2007; Waraich *et al.* 2007). Fluegel & Johnson (2001)** reported that higher N dose had a positive effect on plant height and dry matter. Higher N resulted in increasing spikes/m^2 **(Iqtidar *et al.* 2006).** Also, **Ram *et al.* (2002)** reported significant increase in grain yield up to 120 kg N/ha.

Arif *et al*., (2006) tried wheat as a dual purpose crop and concluded that non-cut plots produced significantly more spikes, grains/spike, grain weight, grain yield and the biological yield. Similary, **Khalil *et al.*, (2011)** studied wheat as dual-purpose crop under different seeding rates and nitrogen fertilization levels and noticed grain yield decreased with delayed in chipping, while no cutting produced tallest plants with highest grain yield, tiller/plant, number of grains/spike and 1000- seed weight.

Barley (*Hordeum vulgare L.*) was one of the most important food crops during the ancient world and will be, as mentioned in the Holy Quran and in the Bible. Today, efforts are being done to get its atmospsts production of vegetative growth and grain yield as well. Its major utility as food crop has reduced but it is still used as fodder crop throughout the world. Many researchers have worked out the practices of dual purpose production as i.e. **Yau *et al.*, (1989)** where they reported single grazing at the tillering stage reduced both grain and straw yield of barley**. El-shatnawi and Makhadmeh (2002)** studied seedling growth and development of wild oat and dual-purpose barley in pots and under field conditions.

Along the same line, Triticale (*Triticosecale Wilt*) is currently used as a grain feed for animals used as a dual purpose crop in some recent studies **(Andrews *et al.*, 1991; Royo *et al.*, 1993).**This dual management practices permits forage production early in the season in addition to the grain yield as well. Environmental conditions affected grain production and protein content more than forage yield and quality. Winter triticales yielded about 43% more forage than spring types, but after forage removal spring types yielded about 36% more grain than winter triticales. The reduction in grain yield after clipping was more pronounced in winter (32%) than in spring (19%) types. Forage crude protein content was significantly higher in the spring (24.6%) than in the winter types (23.5%). An opposite situation being true for fiber content (20.7 and 21.6% respectively). Grain crude protein content did not differ between grain and dual-purpose practices, but was higher in the spring triticales

(12.8%) than in the winter types (11.9%). There was more variability for the measured traits within the winter triticales studied than within the spring types.

It is more likely possible using grain cereal crops as a dual purpose production for food and feed, when using the appropriate agricultural management practices for such purpose. Among such agronomic practices is more likely nitrogen fertilization.

Nitrogen application is an essential management practices, which influence crop plants foliage as a forage material and for its foliage vegetative regrowth and for grain yield as well. It is reported that different N application significantly affected yield and its components of wheat **(Dean and Munford, 2004; Singh et al., 2000).**

Therefore, this study was designed and implemented to estimate the efficiency of three cereal crops *i.e.* wheat, barley and triticale) for their dual production of an early single cut as a forage material and the late foliage regrowth for grain production under three nitrogen fertilization levels *i.e.* 0,100 and 200 kg N/fed as a stimulus factor all of the metabolic function of vegetative growth and grain production as well at the conditions of south delta.

MATERIALS AND METHODS

Two field experiments were carried out at the Experimental Research Station, Faculty of Agriculture, Benha University during 2010/2011 and 2011/2012 seasons. This was to investigate the potentiality evaluation of grain and forage yield of some winter cereal crops using different nitrogen fertilization levels. Experimental design was split- plot where nitrogen fertilization levels were randomly distributed in the main plots and cereal crops in the split- plots. The production of the signal individual cut as a forage and the grain yield were obtained during each of the two growing seasons. Combined analysis of each of the two seasons was done after insuring the validity of partlet test (**Steel and Torrie, 1981).** The applied treatments were as follows:

A - Common cereal crops:

1-Wheat (*Triticum aestivum,L.*). Var. Sakha 94.

2- Barley (*Hordum vulgare,L.*). Var. Giza 2000.

3-Triticale (*Triticosecale Wilt*). ARC selection

Seeds of each of the three cereal crops were provided through the Wheat Department, Agriculture Research Center, Ministry of Agriculture at Giza, Egypt. The recommended seeding rates of each of the above forage crops were followed properly. Seeds were sown on November, 14^{th} in each of the two growing seasons.

B- Nitrogen fertilizer levels: Three nitrogen levels of 0, 100 and 200 kg N/fed. as ammonium nitrate (33.5% N) . Each of the three levels was splitted into two doses; the first was applied before the first irrigation, and the second dose was added after foliage clipping of each crop to be used as a forage material).

Studied parameters: the early foliage growth was cut in 60 days from sowing for each of the two growing seasons. Whereas, the revegetative growth was left for the substantial regrowth vegetative up to grain formation and ripping.

Fresh and dry foliage yield in each experimental unit of the grown cereal crop plants under study was determined. Dry matter percentage of the fresh foliage was determined as follows:

Samples of about 200 gm of fresh forage were selected randomly from each experimental unit (just before cutting) and weighted accurately. Such obtained fresh samples were dried in an air forced drying oven at 105° till constant weight to determine the dry matter content. Then, dry yield per feddan was estimated. Nutrient foliage components for quality evaluation as CP and CF were analysed and recorded.

Grain yield and its components: For grain production, the guarded plants of randomly selection inner square meter from each experimental unit were harvested (after 130 days from cutting) and the following parameters were estimated.

1-Plant height, measured from the soil surface to the almost spike top excluding the awans and recorded as the mean for the randomly selected 10 plants.

2-Spike length, as an average length of the10 spikes excluding the awans were measured.

3-Number of tillers/m^2 was estimated by counting number of spikes in the randomly selected m^2 area.

4-Weight of spike (g), ten spikes was randomly taken from each experimental unit.

5-Number of spikelets/spike, calculated as the average of 10 spikes randomly selected.

6-Weight of 1000 grains (g), calculated as an average of 10 samples each counted 200 grains from each experimental unit.

7- **Grain yield** (ton/fed), determined by threshing the harvested area in each experimental unit and weighting the grains.

8- **Straw yield** (ton/fed), determined by estimating the difference between biological yield and grain yield of the harvested area in each experimental unit.

9- **Biological yield** (ton/fed) = (Grain yield (ton/fed) + Straw yield (ton/fed).

Chemical analysis:

Chemical analysis was conducted and presented on dry matter basis. Out of the randomly taken ¼ m^2 accurately weighed samples of fresh forage for about 200 gm were dried using an air forced drying oven at 75°C till a constant weight. Samples were dried in a labeled Kraft paper bags which were laid in an air forced drying oven all over the drying period. Dried samples were then cooled at room temperature, ground finely and screened through the using hummer mill of 40 michs. The screened fine grounded samples were kept in sealed labeled plastic bags and stored in the refrigerator at 5°C till needed for the chemical analysis.

Two randomly selected samples of each of the two replicates for each treatment were mixed thoroughly to form two composite samples out of the 4 replicates. Out of each of the two composite samples, two analysis were done for each treatment, the average results of each analysis in the study were recorded.

The conducted chemical analysis of forage quality components included the following contents:

1-Crude protein (CP) content:

Total nitrogen percentage was determined according to the modified micro kjeldahl method. Crude protein content was estimated by multiplying nitrogen percentage by 6.25 (A.O.A.C., 1995).

2-Crude fiber (CF) content:

Crude fiber percentage was determined according to the **A.O.A.C. (1995).**

Statistical analysis: The analysis of variance for data of each of the two growing seasons and their combined analysis were carried out according to **Steel and Torrie (1981).** The **L.S.D**. test at the 5% level was used in means comparison.

RESULTS AND DISCUSSION

-Earliest vegetative growth:

-Fresh and dry yield:

Combined analysis of the obtained data of the two seasons generally showed that there were appreciable differences among the grown cereal crops in their fresh and dry forage yield during each of the two growing seasons with variable significant magnitudes. Barley crop was of the highest fresh and dry forage yield followed by Triticale, then Wheat crop with significant differences. The respective ranking order for fresh foliage yield was 17.33, 8.84 and 3.73 ton/fed., being 2.30, 1.23 and 0.57 ton/fed., for dry yield. This trend was clear during each of the two growing seasons (Table, 1).

The differences in fresh and dry yield of Wheat, Barley and Triticale may be due to their individual specific genetical make up that interact differently with the prevailing environmental conditions of this study. Similar results were reported by **Fluegel &Johnson (2001)** for Wheat.

Over the studied cereal crops, fresh and dry foliage yield were generally increased as nitrogen fertilization levels increased from 0 to 100 and up to 200 kg N/fed., with significant differences of various magnitudes. The respective fresh yield was 6.29, 9.56 and 14.07 ton/fed being 0.73, 1.24 and 2.13 ton/fed for dry yield, respectively as nitrogen levels increased from 0 to 100 and up to 200 kg N/fed, respectively. Similar results were reported by **Hadi *et.al* (2012)** for barley.

Such obtained results may insure the important role of nitrogen in stimulating and enhancing the photosynthetic and the metabolic activities of plants which are reflected on the increase in vegetative growth of the grown plants and the accumulated stored carbohydrate materials that are consumed for the earlier regrowth of the subsequent vegetative growth and the grain production as well. The increase in the biophysiological growth activities were for sure reflected on the total fresh foliage yield as well as their relevant grain yield production of the grown cereal crops under study.

The interaction effect of cereal crops and nitrogen fertilization levels on fresh and dry forage yield was significant with various magnitudes. Whereas, results generally indicated that the highest fresh and dry forage yield were obtained from barley plants when fertilized at the high nitrogen levels of 200kg N/fed. Meanwhile, the lowest fresh and dry forage yield were obtained from wheat plants fertilized with the lowest levels of nitrogen (0kg N/fed).

- Yield and its components:

-Yield productivity:

Results in Table (1) clarified appreciable differences among the studied cereal crops under the applied nitrogen fertilization levels. It was clear from the combined analysis of the two seasons.

Over the applied nitrogen fertilization levels, results of the combined analysis of the two growing seasons indicated significant differences in grain, straw and biological yield among the studied cereal crops (wheat, barley and triticale). Triticale was superior crop as compared with the other cereal crops in grain, straw and biological yield production with significant difference magnitudes. So, it could be concluded that the ranking descending order was as follow: triticale $_{(1.19),}$ followed by wheat $_{(1.04),}$ then barley $_{(0.88\ ton/fed)}$ for grain yield, being triticale $_{(3.09),}$ followed by wheat $_{(2.40),}$ then barley $_{(1.74\ ton/fed)}$ for straw yield. Along the same line for biological yield was triticale $_{(4.28),}$ followed by wheat $_{(3.44),}$ then barley $_{(2.62\ ton/fed)}$, with significant difference (Table, 1). The obtained results showed the various production capabilities of the grown cereal crops under the prevailing environmental conditions and the other cultivation circumstances. Such noticed differences in yield among the studied cereal crops (wheat, barley and triticale) were also due to the special unique features of their genetical make up under the prevailing environmental conditions of this study with various magnitudes. Similar results were reported by **Yau et.al (1989)** with barley, **Royo and Parest (1996)** with triticale, **Arif et.al (2006)** and **Khalil et.al (2011)** with wheat.

Over the grown cereal crops, the combined analysis (over the two seasons) clarified that the grain, straw and biological yield of each cereal crops substantially increased as nitrogen fertilization levels increased. As the nitrogen levels increased from 0 to 100 and up to 200kg N/fed, grain yield was substantially increased with a respective production of 0.79, 0.96 and 1.04 ton/fed, for grain yield, followed by 1.72, 2.40 and 3.12 ton/fed, for straw yield then 2.51, 3.35 and 4.48 ton/fed, for biological yield, respectively., with significant difference magnitudes (Table, 1).The response of increasing yield production due to the increase in nitrogen application levels may be due to the important role of nitrogen in stimulating and enhancing the vegetative growth and yield productivity as well.

It looks to be true that the total increase in grain yield due to increasing nitrogen fertilization levels from 0 to 100 and up to 200 Kg N/fed., was slightly pronounced during the second than the first one as it is clear from the following comparative set of data.

Kg N/fed.	Obtained grain yield (ton/fed)	
	First season	Second season
0	0.64	0.95
100	0.72	1.20
200	1.00	1.72

It is obviously clear that the obtained differences in grain yield for each of the grown cereal crops (wheat, barley and triticale) was of course due to their individual specific genetical make up that interact differently with the prevailing environmental conditions under this study in various specific patterns. Such obtained results are along the same line as those of **Singh *et al.*(2000), Dean and Munford (2004),Ahmad *et al.*(2007) and Waraich *et al.*(2007)** with Wheat.

Table 1: Productivity evaluation of foliage and grain yield of some winter cereal crops under different nitrogen levels (Combined over two seasons).

Cereal Crops (C)	Nitrogen Levels (N) (kg /fed)	Foliage yield (ton/fed)		Grain yield (ton/fed.)	Straw yield (ton/fed.)	Biological yield (ton/fed.)
		Fresh	Dry			
Wheat	Zero	2.33	0.30	0.82	1.48	2.29
	100	3.07	0.44	0.97	2.26	3.23
	200	5.80	0.98	1.33	3.47	4.79
Mean		**3.73**	**0.57**	**1.04**	**2.40**	**3.44**
Barley	Zero	11.60	1.29	0.62	1.33	1.95
	100	16.93	2.14	0.75	1.81	2.56
	200	23.47	3.47	1.28	2.08	3.36
Mean		**17.33**	**2.30**	**0.88**	**1.74**	**2.62**
Triticale	Zero	4.93	0.59	0.94	2.34	3.28
	100	8.67	1.15	1.16	3.12	4.28
	200	12.93	1.94	1.48	3.81	5.29
Mean		**8.84**	**1.23**	**1.19**	**3.09**	**4.28**
Zero		**6.29**	**0.73**	**0.79**	**1.72**	**2.51**
100		**9.56**	**1.24**	**0.96**	**2.40**	**3.35**
200		**14.07**	**2.13**	**1.36**	**3.12**	**4.48**
Mean		**9.97**	**1.37**	**1.04**	**2.41**	**3.45**
L S D for 5%:		C= 0.63 N= 0.63 NY= 0.90 CN= 1.10 CNY= 1.55	C= 0.09 N= 0.09 NY= 0.12 CN= 0.15 CNY= 0.21	C= 0.68 N= 0.68 CY= 0.96 NY= 0.12	C= 0.16 N= 0.16 CY= 022. CN= 0.27 CNY= 0.39	C= 0.24 N= 0.18 CY= 0.33 CN= 0.32 CNY= 0.45

*N as ammonium nitrate (33.5 %).

- Studied Yield Components:

Over the tested nitrogen fertilization levels, combined analysis (Table, 2) indicated significant variations in weight of spike, number of tillers/m^2 and number of spikelets / spike among the three cereal crops inspite of the different range in between. The descending ranking order for the weight of the spike, number of tillers/m^2 and number of spikelets / spike was for triticale, wheat and barley. The respective weight of the spike was 3.31, 3.08 and 2.78g, with significant differences. Regarding, number of tillers/m^2 was 229.33, 217.56 and 212.22 tillers /m^2, without significant differences. In this respect, number of spikelets / spike was of 22.44, 15.56 and 13.56 spikelets / spike with significant differences. In this connection, another trend was noticed for weight of 1000-grain of barley $_{(44.03)}$, wheat $_{(43.08)}$ and triticale $_{(39.94g)}$, with significant differences, respectively. Along the same line, spike length of the studied cereal crops was barley $_{(14.89)}$, triticale $_{(14.13)}$ and wheat $_{(10.80\ cm)}$, with significant differences, respectively (Table 2). In this respect, the noticed differences in the above mentioned characters among the studied cereal crops were due to each of the special unique features of their genetical make up which interacted with the environmental conditions. Similar results were reported by **Ram *et al.,* (2002), Iqtidar *et al.* (2006)**, **Arif *et.al* (2006) Khalil *et.al* (2011)** with wheat and **Hadi *et.al* (2012)** with barley.

Regarding nitrogen fertilization levels, combined analysis revealed significant differences in weight of spikes and number of tillers/m^2 (over the three grown crops) according to the assigned nitrogen fertilization levels (table, 2). Over the grown of cereal crops, combined analysis revealed a significant increase in weight of spike and number of tillers/m^2 by increasing nitrogen levels from 0 to 100 and up to 200kg N/fed., having respective spike weight of 2.31, 3.06 and 3.80 g. Concerning, , number of tillers/m^2 was 174.67, 215.56 and 268.89 tillers/m^2. In this respect, an opposite trend was noticed for weight of 1000-grain, number of spikelets / spike and spike length, having the respective weight of 1000-grain was 46.53, 42.53 and 38.0g. Regarding, number of spikelets / spike was 19.06, 17.28 and 15.22 spikelets / spike, respectively. with significant differences. Along the same line, the respective spike length was 14.89, 13.04 and 11.89 cm, with slight significant differences as shown in Table (2).

-Vegetative growth characteristic:

- Plant height:

Over the applied nitrogen levels, it is generally noticed from Table (2) that plants of triticale were the tallest (113.05cm) while barley plants were of the shortest (84.28cm) ones, and the wheat plants were in half-way between (87.03cm). It looks to be true that plant height acted in a similar manner for each of the two growing seasons. Similar results were reported **by Fluegel and Johnson (2001)** for Wheat.

Over the three growing cereal crops, increasing nitrogen levels caused significantly continuous increase in plant heights. The respective plant height were 84.46, 96.59 and 103.32 cm as nitrogen levels increased from 0 to 100 and up to 200 kg N/fed. Similar results were reported by **Khalil *et.al* (2011)** for wheat and **Hadi *et.al* (2012)** for barley.

- Nutritive value:

- Crude protein (CP) content:

It should be known that the presented crude protein and crude fiber contents were determined for the first foliage growth (as a forage material). Whereas, foliage regrowth was not considerable to the quality analysis. From the combined analysis (Table,3) results indicated significant differences in CP content among the tested cereals having ranking order of wheat (14.59) > triticale (12.71) > barley (12.59), with slight significant differences.

It is generally noticed that Wheat crop contained the highest CP content. Meanwhile, barley was of the lowest CP content with significant differences. The superiority of wheat was of about 15.88 % higher in CP content as compared with barley. Such variations in CP contents may be due to the differences in their genetically specific and/or their interaction with the prevailing environmental conditions under this study. Similar results were reported **by Hossain *et al.,* (2003)** with Wheat.

Table 2: Evaluation of yield components of some winter cereal crops under different nitrogen fertilization levels (Combined over two seasons).

Cereal Crops (C)	Nitrogen Levels (N) (kg N/fed)	Weight of 1000-grain (g)	Weight of spike (g)	No. of tillers/m^2	No.of spikelets / spike	Spike length (Cm)
Wheat	Zero	48.58	2.23	174.00	17.17	11.93
	100	42.75	3.23	214.00	15.67	10.60
	200	37.92	3.77	264.67	13.83	9.87
Mean		**43.08**	**3.08**	**217.56**	**15.56**	**10.80**
Barley	Zero	48.08	1.83	173.33	17.33	16.60
	100	43.92	2.67	196.00	13.50	14.60
	200	40.08	3.83	267.33	9.83	13.47
Mean		**44.03**	**2.78**	**212.22**	**13.56**	**14.89**
Triticale	Zero	42.92	2.87	176.67	22.67	16.13
	100	40.92	3.27	236.67	22.67	13.93
	200	36.00	3.80	274.67	22.00	12.33
Mean		**39.94**	**3.31**	**229.33**	**22.44**	**14.13**
Zero		**46.53**	**2.31**	**174.67**	**19.06**	**14.89**
100		**42.53**	**3.06**	**215.56**	**17.28**	**13.04**
200		**38.00**	**3.80**	**268.89**	**15.22**	**11.89**
Mean		**42.35**	**3.06**	**219.71**	**17.19**	**13.27**
L S D for 5%:		C= 2.18 N= 2.18 CY= 3.08	C= 0.20 N= 0.20 CN= 0.35 CY= 0.28	N= 13.77 CY= 19.47	C= 0.63 N= 0.63 CN= 1.10 CY= 0.90 NY=0.90	C= 0.58 N= 0.58

Over the grown cereal crops, combined analysis revealed a significant increase in CP content of their foliage by increasing nitrogen levels from 0 to 100 and up to 200kg N/fed.

having respective CP content of 12.32, 13.53 and 13.99%, respectively. This trend of increasing CP content as the nitrogen levels increase was recorded for each of the two growing seasons and their combined analysis with slight significant differences as it is clear from the recorded data in Table 3. Similar results were reported **Royo and Parest (1996)** for triticale.

- Crude fiber (CF) Content:

Over the applied fertilization levels, combined analysis (Table, 3) showed that crude fiber (CF) content significantly varied among the three grown cereal crops. The obtained CF content could be ranked in the following descending order: barley (29.51%), wheat (27.79%) and triticale (27.14%) with significant differences in both seasons. From the combined analysis (over the three cereal crops), data cleared that increasing nitrogen application levels caused slight significant increase in CF of the obtained earliest single foliage growth in both seasons especially when comparing between the effect of the low (0 kg N/fed) and highest (200 kg N

Table 3: Productivity evaluation of plant height, foliage crude protein and foliage crude fiber contents of some winter cereal crops under different nitrogen levels (Combined over two seasons).

Cereal Crops (C)	Nitrogen Levels (kg N/fed)	Plant height (Cm)	Crude protein (%)	Crude fiber (%)
Wheat				
	Zero	77.47	13.30	26.26
	100	90.40	15.00	27.47
	200	93.23	15.35	29.63
Mean		**87.03**	**14.59**	**27.79**
Barley	Zero	70.27	11.73	27.45
	100	87.20	12.60	29.79
	200	95.36	13.44	31.28
Mean		**84.28**	**12.59**	**29.51**
Triticale	Zero	105.63	11.95	25.65
	100	112.17	13.00	27.22
	200	121.37	13.18	28.56
Mean		**113.05**	**12.71**	**27.14**
Zero		**84.46**	**12.32**	**26.46**
100		**96.59**	**13.53**	**28.16**
200		**103.32**	**13.99**	**29.83**
Mean		**94.79**	**13.28**	**28.15**
L S D for 5%:		C= 3.04 N= 3.04 CY= 4.24	C= 0.18 N= 0.18 CY= 0.54 NY= 0.54	C= 0.37 N= 0.37 CNY= 0.91

/fed) nitrogen levels. The obtained CF content was 26.46, 28.16 and 29.83% when applying 0, 100 and 200 kg N/fed, respectively.

Combined analysis indicated significant interaction effect of the imposed factors under study (Cereal varieties x Nitrogen levels) on CF content of the obtained forage.

Also, results indicated that each of the three cereal crops was affected differently by the applied nitrogen levels in their response to their CF content (Table, 3) which increased by increasing nitrogen levels for barley fertilized with the highest nitrogen level (200 kg N/fed) produced the highest CF content (31.28%). Meanwhile, triticale variety contained the lowest CF content (25.65%) fertilized with the lowest nitrogen level (0 kg N/fed.). Similar results were reported **Royo and Parest (1996)** for triticale.

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تقييم الإنتاج المزدوج لمحصول الأعلاف والحبوب لبعض محاصيل الحبوب الشتوية تحت المستويات المختلفة من التسميد النيتروجينى

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أجريت تجربتان حقليتان بمزرعة مركز البحوث والتجارب الزراعية بكلية الزراعة بمشتهر – جامعة بنها وذلك خلال موسمي الزراعة الشتوى ٢٠١٠/٢٠١١ ، ٢٠١١/٢٠١٢ بهدف تقييم الإنتاجية المحصولية (المحصول الأخضر والجاف) وكذا محصول الحبوب ومكوناته لثلاث محاصيل حبوب شتوية وهى قمح سخا ٩٤ – شعير جيزة ٢٠٠٠ – ترتيكال صنف منتخب بواسطة مركز البحوث الزراعية وذلك تحت ثلاث مستويات من التسميد الآزوتى (صفر- ١٠٠- ٢٠٠ كجم ن/ف) وقد استخدم تصميم القطع المنشقة مرة واحدة لأربعة مكررات. حيث وضعت محاصيل الحبوب فى القطع الرئيسية ومستويات التسميد الازوتى فى القطع الشقية بنظام عشوائى.

ويمكن تلخيص أهم النتائج المتحصل عليها فيما يلي :

- أوضحت النتائج تفوق الشعير فى محصول العلف الأخضر و الجاف،وزن الـ ١٠٠٠ حبة وطول السنبلة و نسبة البروتين الخام بينما كان الترتيكال المحلى الافضل فى باقى الصفات المدروسة.
- اشارت النتائج ان إضافة السماد الأزوتى بمعدل ٢٠٠ كجم ن/ف الى الحصول على أكبر انتاج علفى أخضر و جاف و كذلك محصول الحبوب ومكوناته و كذلك على أطول النباتات بينما انخفض طول السنبلة و عدد السنيبلات /سنبلة و وزن الـ ١٠٠٠ حبة بزيادة معدلات السماد الأزوتى.

وكانت افضل المعاملات زراعة الترتيكال المحلى مع التسميد بمعدل ٢٠٠ كجم ن/ ف للحصول على اعلى إنتاجية من العلف الاخضر الطارج وكذا إنتاج الحبوب تحت الظروف البيئية السائدة لجنوب الدلتا.