

RESPONSE OF BARLEY PLANTS TO ORGANIC MANURE AND NITROGEN FERTILIZATION UNDER SANDY SOILS CONDITION

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ABSTRACT:

Two field experiments were carried out at one of the farm of EL Zawiah Zone , Libya during 2006 / 2007 and 2007/2008 season to study the response of barley plants cv California mariot to cheep manure (0, 50, 75 and 100 m³/ hectare)and nitrogen fertilizer such as, urea (46 % N) (100 ,150 and 200 kg N / hectare). A split-plot design with three replicates was used in both growing seasons.

The results revealed that, application of organic manure at the rate of 75m³/hectare gave highest values on vegetative characters(plant height, number of tillers/m³, number of spikes/m³, spike length and flag leaf blade area) and total chlorophyll, as well as yield and its components(1000-grain weight, grain yield Ardab/hectare and straw yield).

By increasing the nitrogen fertilization level up to 200 kg N/hectare gave too the highest values of the characters above mentioned. Regarding the interaction effect, the treatment of 75m³ cheep manure/hectare and 200kg N/hectare, was recorded the highest values of most studied characters in this respect.

Key words: Barley, organic manure, nitrogen fertilization.

INTRODUCTION:

Barley is one of the most of important winter crops in most of the soils at Libyan condition. It is used mainly for feeding animals and for bread making, as well as , it is used for malting in the brewing industry .

More of barley is grown in marginal lands either macro or micro elements. And thus, organic manuring and nitrogen fertilization are considered among the most important cultural practices for increasing barley productivity.

Many investigators were studied the response of barley plants to organic manure application, they reported and illustrated that organic manure improves the proprieties of the soil and increased the growth characters , grain and as well as, straw yields 1000 – grain weight. In addition, increased the chlorophyll content in barley leaves (Sharma *et al.*, 2001; El – Toukhy and Abd–Alla, 2002, Salib Madlain *et al.*, 2002; Berez *et al.*, 2005 and Gaballah and Mowafy, 2007).

Nitrogen fertilization increased plant growth parameters, yield and its components, chlorophyll content of leaves of barley plants (Abd–Alla, Maha, 2004; El–Moselhy and Zahran, 2003 and Kotb and Gaballa, 2007). This investigation aimed to study the response of barley plants to fertilization with organic manure and nitrogen fertilization under sandy soils condition.

MATERIALS AND METHODS

Two field experiments were carried out at one of the farm of EL Zawiah Zone, Libya during 2006\2007 and 2007 / 2008 season to study the response of barley plants cv California mariot to organic manure ,i.e.cheep manure (0, 50, 75 and 100 m³/ hectare) and nitrogen fertilizer such as, urea (46% N) (100 ,150 and 200 kg N / hectare).

A split-plot design with three replicates was used in both growing seasons. The organic manure treatments were assigned to the main plots and nitrogen fertilizer levels were distributed in the sub- plots. Plot area was 9 m² (3 x 3) including 15 rows 20 cm apart in 3 m long. Barley seeds were sown by hand drilling on 18th and 19th of November in the first and second seasons, respectively. The soil of the experimental site is sandy in texture. Chemical analysis of the soil are shown in Table 1 and cheep manure are shown in Table 2.

The sub–plots included nitrogen fertilizer levels (100, 150 and 200 Kg/ hectare), which applied at three equal doses. The first dose was added during seedbed preparation and the second and the third after three weeks between its ,respectively.

Tables 1. The chemical analysis of the experiment soil.

Characters	Values
Available potassium	115 ppm
Available nitrogen	88 ppm
pH	7.6
Organic manure	0.8 %
Cation exchangeable Capacity (C.E.C.)	19.0 (meg. / 100g.soil)
Soil texture	Sandy loam

Table 2. The chemical analysis of used cheep manure in the experiment soil.

Chemical contents and characters	Values
pH	6.8
Electric Conductivity (EC)	3.6(mm/cm)
Total organic carbon	26.8 %
C/N ratio	1:33.5
Total nitrogen	0.9 %
Total potassium	0.3 %
Aching	6 %
Moisture	55 %

The other agronomic practices were adopted as recommended in El-Zawiah zone soils condition. Spray irrigation system was used .

After 90 days from sowing, a ten competitive plants were randomly taken the second inner rows of each plot to determine the vegetative growth characters as follows:

- 1- Plant height (cm) was determined from the soil surface to the top of the main spike excluding awns.
- 2- Flag leaf blade area (cm²),(long x width x 0.72).
- 3- Total chlorophyll (mg/g): (chlorophyll a + chlorophyll b).

Chlorophyll and a b were determined according to the method of Fadeel (1962) by using spectrophotometrically at 662 nm and 644 nm to determine chlorophyll a and b, respectively.

At harvest time, an area of two m² from each plot was harvested to determine:

- 1- Number of tillers /m² .
- 2- Number of spikes /m² .
- 3- 1000-grain weight (g)
- 4- Grain yield ardab / hectare .(Ardab= 120 kg).
- 5-Straw yield (ton / hectare). (Ton=1000 kg ; Hectare =10000 m²).

The results were subjected to standard analysis of variance according to the procedure described by Snedecor and Cochran (1980). for comparison between means, Duncan,s multiple test was used (Duncan, 1955).

RESULTS AND DISCUSSION

Vegetative growth and chlorophyll content :

a. Effect of organic manure :

Data illustrated in Table (3) indicate clearly that plant height, both number of tillers and spikes per m², spike length and flag leaf blade area as well as total chlorophyll were significantly increased with increasing rate of organic manure (cheep manure) up to 75 m³/ hectare and then decreased.

The increment in barely vegetative growth might be attributed to the role of organic manure for releasing the macro and micro elements to barely plants in enhancing the growth and dry matter accumulation (Yakout *et al.*, 1998). These results are in agreement with those reported by Sharma *et al.*, 2002; El-Toukhy and Abd -Alla, 2002; Salib, Madlain *et al.*, 2002; Berez *et al.*, 2005 and Gaballah and Mowafy, 2007).

b- Effect of nitrogen fertilization :

Data in Table (3) revealed that barely vegetative growth characters and chlorophyll content above mentioned were significantly increased by increasing N level form 100 to 200 kg / hectare As the role of nitrogen nutrient in plants, Edmond *et al.* (1981) concluded that nitrogen is an indispensable elementary constituent of numerous organic compounds of general importance (amino acids, protein, nucleic acids and it increased in formation of protoplasm and new cells as well as encourage for cell elongation. These results are confirmed with the results obtained by Sarhan *et al.* (2002); Abd-Alla Maha (2004); El – Moselhy and Zahran(2003); El – Bawab *et al.*(2003) and Kotb and Gadalla (2007).

Yield and it components :

a- Effect of organic manure :

Data in Table (4) illustrated that 1000- grain weight, grain yield / hectare and straw yield / hectare were significantly increased by increasing organic manure rate from 50 to 75 m³ /hectare and then decreased. The increments in barely yield with 75 m³ /hectare may be attributed to the good vegetative plant growth (Table 3) and to the improving effect of micro and macro – elements contained in organic manure which important for the activity of the bio–operations and the accumulation of metabolism in reproductive organs and this reflects on the spikes and grains and total yield. These results are in confirming with those reported by Berez *et al.* (2005) and Gaballah and Mowafy (2007).

b- Effect of nitrogen fertilization :

Data in Table (4) showed also that 1000– grain weight, grain yield (Ardab /hectare)and straw yield (ton/hectare) were significantly increased by increasing N–level from 100 to 200 kg/hectare, in both growing seasons.

The favorable effect of N – application (200 kg / hectare) are recommended for barely to stimulate plant growth (Table 3) and yield and its components (Table 4). These results are in agreement with those reported by Noworolink and Pecio, 1989; El – Hindi *et al*, 1998; El – Kholy *et al.*, 1998; Abd – Alla, Maha, 2004; El – Moselhy and Zahran, 2003; El – Bawab *et al.*, 2003 and Kotb and Gaballa, 2007.

Regarding to the interaction between 75m³/ hectare (cheep manure) and 200 kg / hectare (N –fertilization, urea) increased the most of characters studied in both seasons of experiment under El-Zawiah zone soil condition in Libya (Tables 5 and 6).

Conclusively, it can be concluded that the best treatment for high barely plant growth, total chlorophyll content of leaves and yield and its components were 75m³/ hectare (cheep manure), 200 kg / hectare (N–fertilization), as well as, the interaction between 75m³/ hectare (cheep manure) and 200 kg / hectare (N–fertilization,urea) in both seasons of experiment under El-Zawiah zone soil condition in Libya (Tables 5 and 6).

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استجابة نباتات الشعير للتسميد العضوي والنيتروجين تحت ظروف الاراضى الرملية

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أجريت تجربتان حقليتان في موسمي شتاء ٢٠٠٧/٠٦ ، ٢٠٠٨/٠٧ في إحدى مزارع الزاوية – ليبيا – لدراسة تأثير التسميد العضوي (سماد الغنم) والتسميد النيتروجيني (اليوريا ٤٦ % N) على نمو محصول الشعير صنف كاليفورنيا مريوت كان تصميم طريقة القطاعات المنشقة هو المستخدم في التجربة في ثلاث مكررات في كلا موسمي الدراسة، وقد وضحت النتائج أن :
إضافة السماد العضوي بمعدل ٧٥ م^٣ / هكتار أعطى أعلى القيم لكل من صفات النمو الخضري (ارتفاع النبات عدد الاشطاء / م^٢ ، عدد السنابل / م^٢ ، طول السنبل) ومساحة ورقة العلم والمحتوى الكلى للكوروفيل ، المحصول ومكوناته (وزن ألف حبة ، محصول الحبوب بالإردب / هكتار ، محصول القش بالطن / هكتار).
بزيادة إضافة التسميد النيتروجيني حتى أعلى معدل أعطى أعلى القيم أيضا للصفات المذكورة سابقا.
بالنظر إلى تأثير التفاعل بين السماد العضوي والتسميد النيتروجيني، كانت المعاملة ٧٥ م^٣ / هكتار مع ٢٠٠ كجم / هكتار سجلت أعلى القيم لمعظم الصفات المدروسة.
وتحت ظروف الاراضى الليبية المشابهة لأراضى التجربة يوصى باستخدام هذه المعدلات.