



EFFECT OF COATED UREA AND NITROGEN LEVELS ON NITROGEN UPTAKE BY WHEAT (*TRITICUM AESTIVUM* L.)

Faisal Mihbes Al-Taher and Ragheb Hadi Ajme Al-Bourky

Department of field crops, Collage of agriculture, Al-Muthanna University, Iraq

Abstract

A field experiment was carried out at the second research station (Al-Bandar) of College of Agriculture, Al-Muthanna University during the tow winter season 2018 and 2019 to determine the effect of coated urea and nitrogen doses on nitrogen concentration in growth stage of Wheat. The Strip-plot design with three replicate. The horizontal blocks was occupied coated treatment (C1, C2, C3, C4, C5, C6,C7,C8, C9, C10) and vertical blocks occupied with nitrogen doses (250%, 50%, 75%, 100%),the result showed that coated urea was significant effect of nitrogen concentration in wheat plant and the treat C4 was superior in seedling stage, tillering stage, booting stage and give (12.33 g.kg⁻¹, 14.28 g.kg⁻¹ and 15.83 g.kg⁻¹, 19.46 g.kg⁻¹ and 20.90 g.kg⁻¹) in both season. The nitrogen doses P3 was superior in seedling stage (12.15 g.kg⁻¹) in second season, tellering stage give (14.28 g.kg⁻¹ and 15.80 g.kg⁻¹), elongation stage (16.93 g.kg⁻¹ and 15.21 g.kg⁻¹), booting stage (19.92 g.kg⁻¹ and 21.41 g.kg⁻¹) in both season.

Keywords: Wheat (*Triticum aestivum*). Coated urea, nitrogen doses, nitrogen concentration.

Introduction

The yield of wheat bride is important seeds crops in world, and its main source of food for more than third people of world. The important refer to content seed on glutens it's the basic protein to product good quality to made bride, Although Iraq one of the ordinal place where the wheat found and existence the main factor of product like water, soil and climate condition but the production of crop don't provide the demand, so there is a gap between product and demand and its don't blocked just 30% from realty needed, that because of don't demand many of new scientific technology in serve crops and soil like add fertilizers in correct dose and correct way (Abdo Woyema *et al.*, 2012). Uses of urea fertilizers as source nitrogen and problem with nitrogen add, the element nitrogen is immobilization in soil so is loses by leaching with irrigation and gases like ammonia gas and nitrification-denitrification, the add nitrogen as slow release fertilizer will give advantage to reduce losing nitrogen(Nelson *et al.*, 2008). The important of nitrogen in nutrition plant and problem with use it so the scientific researches to use technology and different means to reduce that problems and one of that technology is uses coated urea by many natural material and artificial material in coated process (Sing *et al.*, 2013). Efficiency of nitrogen in early time is very important for crops to growth and make leaves and initial flowering, Wheat its effected mainly in nitrogen fertilizer during vegetable growth stages so increase nitrogen levels in right time during vegetable growth will made increase total yield and protein content, such as excepted levels of nitrogen probably get maximum possible yield of protein (Lu *et al.*, 2013). Sulphur coted urea it development by center research in Tennessee state to reduce and treating release nitrogen problem from urea so used this fertilizer on wide range on crops and proved worthy in important part to treat nitrogen problem, its get increase in fertilizes use on wheat, rice, mays. Researches in new Delhi indicated used

SCU get increased yield of wheat was 15.6% compare with urea, so sulphur get many specification as reduce solubility granola of urea and increase efficiency fertilizer used (Shivay *et al.*, 2016). The material used in coated urea as resins, natural polymers and industrial maybe don't give the result because higher prices and in another hand difficult solubility and some may be hazard on environment soil so had to found cheap materials and available, safety and friendly to environment, ability to solubility in water, one of that material it starch and phosphogypsum its can solubility in water or by enzymes, in last year's researchers believe in starch used in many field like agriculture, starch in general considered material water harvest and factor of crystallization and stable emulsion and its have high viscosity. Mixed starch with many coated material worked on raise efficiency coated processing and that additive make to increase length of chain for multi polymer and enhance physics properties (viscosity, thickness and increase superficial area) (Naz *et al.*, 2014).

Materials and Methods

Site of experiment

Field experiment was indicated during two seasons (2018 and 2019) in AL-bandar site to interdicted effect of coated urea in nitrogen uptake by Wheat plant, and the experiment was included two factors, the first was nine treatment of coated urea (C1,C2,C3,C4,C5,C6,C7,C8,C9) and C10 was common urea that was add according recommendation fertilizer and second factor was treatment coated was add as four levels of recommendation fertilizer (25%, 50%, 75%, 100%) to determine their effect on nitrogen absorption and fertilizer efficiency, the treatment was arrangement in Split block design with three replicates. After collection soil sample to analysis (Ph, Ec, O.M, total nitrogen, available phosphor, available potassium, soil texture) the result of soil analysis was showed in table (1).

Table 1 : Some physics and chemical properties of experiment soil

Properties	value		unit
	First season	Second season	
Ph	7,65	7,50	
Ec _e	7.3	7.1	Ds.M ⁻¹
O.M	0.56	0.45	g. kg soil
Total N	0.49	0.65	g. kg soil
N	45	22	Mg. kg soil
P	5.39	5.83	Mg. kg soil
K	204.10	199.57	Mg. kg soil
Sand	611	633	g. kg soil
Silt	322.7	321.1	g. kg soil
Clay	66.3	45.9	g. kg soil
Soil texture	Silty sand	Silty sand	

The study traits: ten random plants were selected from each plot to calculate nitrogen content in stages according zadoks scale:

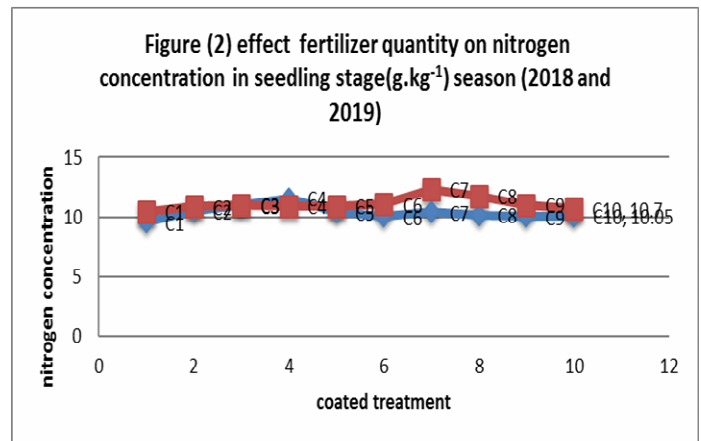
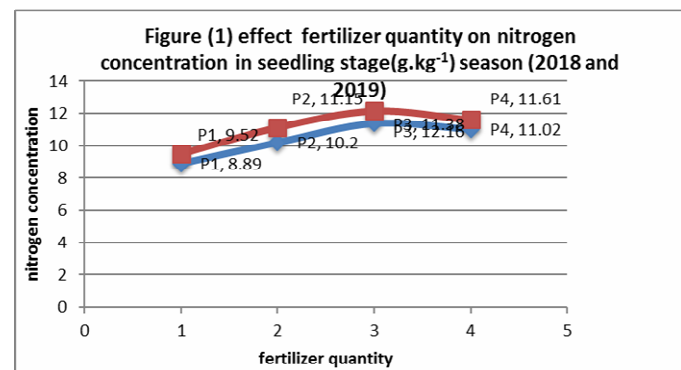
- 1- Seedling stage (Z13)
- 2- Tillering stage (Z21)
- 3- Elongation stage (Z33)
- 4- Boot stag (Z 43)

Result and Discussion

Nitrogen concentration in seedling stage

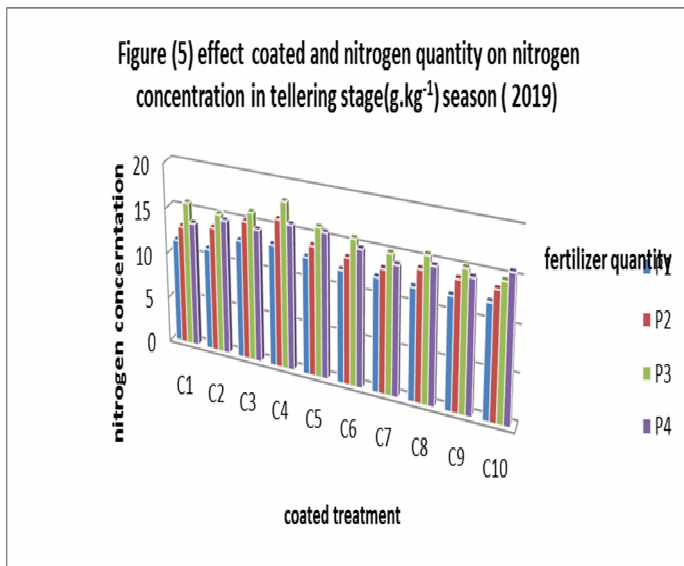
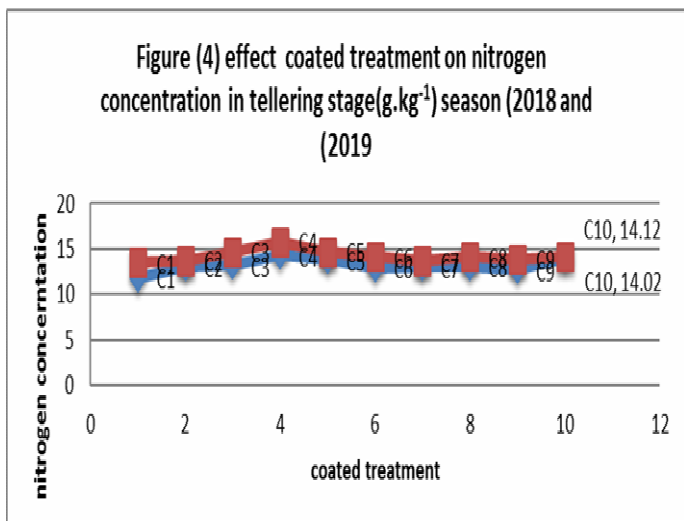
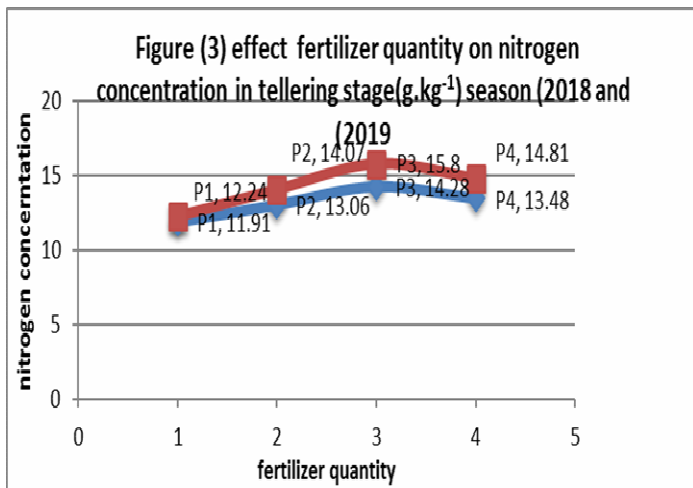
The result in figure(1) showed significant effect of levels fertilizers in nitrogen concentration and the treatment P3(add 75%) in second season and get higher mean 12.15 g.kg⁻¹ while the treat P1(add 25%) get lowest mean 9.52 g.kg⁻¹ for second season, has been reason superior P3 to quantity of nitrogen fertilizer available through stage growth and formation seedling was efficiency for increase absorption quantity of nitrogen and the nitrogen uptake was high during seedling stage than it result increase in nitrogen concentration, this result consistence with the finding of (Roy and Singh 2006, Brad 2008) who founded increase quantity nitrogen fertilizer causes increase nitrogen concentration in plant. The result in figure(2) showed high significant in coated treatment and their effected on nitrogen concentration in plant the treat C4 superior in second season and give 12.33 g.kg⁻¹ while the treat C10 give lowest concentration was 10.45 g.kg⁻¹, has been reason superior C4 for efficiency (starch, cellulose, sulphur) for slow release nitrogen and ability for preparation quantity and efficiency to uptake nitrogen that was positive effect on nitrogen concentration in seedling stage, this result consistence with the finding of Shivay *et al.* (2015) they found the coated urea with sulphur increase nitrogen concentration in wheat plant.

The interaction between two factors was not significant for this characters.



Nitrogen concentration in tillering stage

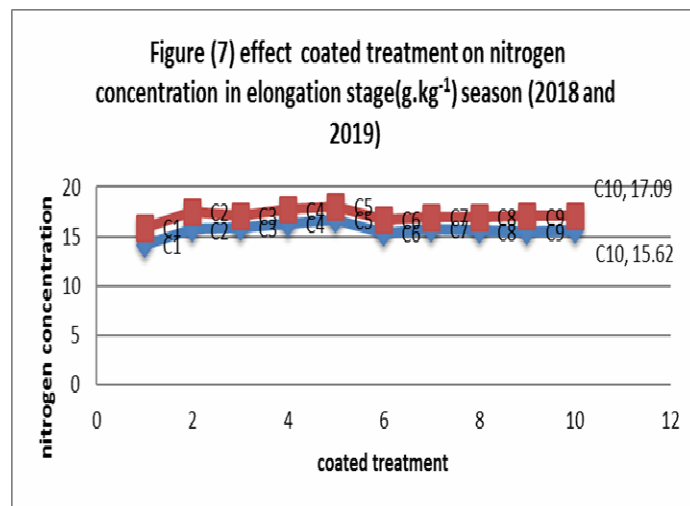
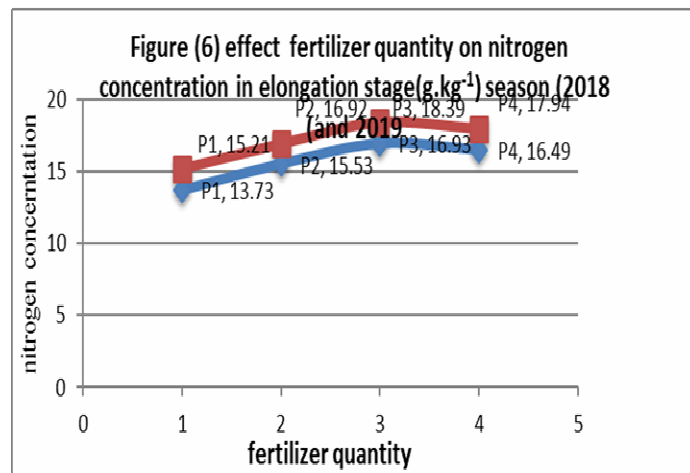
The result in analysis statistical figure (3) that significant different between levels fertilizer in nitrogen concentration during tellers stage, treatment P3 was superior in both season give high means 14.28 g.kg⁻¹ and 15.80 g.kg⁻¹ on sequences, while treatment P1 give lowest means 11.91 g.kg⁻¹ and 12.24 g.kg⁻¹ in both season on sequences, that superior may be was plant needed of nitrogen in this stage because it important stage growth which in average divisions and elongation very quick and photosynthesis high that high active combined nutrition high needed has led to increase absorption elements of which nitrogen therefore increase nitrogen during initial tellers, this result consistence with the finding of AL-aardhy and abdul-khaliq (2015) they founded increase quantity of nitrogen fertilizer get increase nitrogen concentration in wheat crop. In figure (4) founded high significant cause uses coated treatments that had positive effect in nitrogen concentration in tillering stage, the C4 superior in both season and give higher means 14.28 g.kg⁻¹ 15.83 g.kg⁻¹ on sequences while treatment C1 give lowest means 13.20 g.kg⁻¹ and 13.51 g.kg⁻¹ in both season, has been reason superior that treat for it give high ability to provide right quantity in right form to absorption of wheat crop during tillering stage and slowed release nitrogen that may help to efficiency nitrogen during that stage. The result indicated nitrogen concentration during tellers stage figure(5) was high significant on interaction between to factors and the compound superior (P3*C4) in second season and give 18.13 g.kg⁻¹ while compound (P1*C1) give lowest mean 11.43 g.kg⁻¹, has been reason superior that compound to material used in coated starch, cellulose and sulfur it have low solubility in water the proved to superiority.

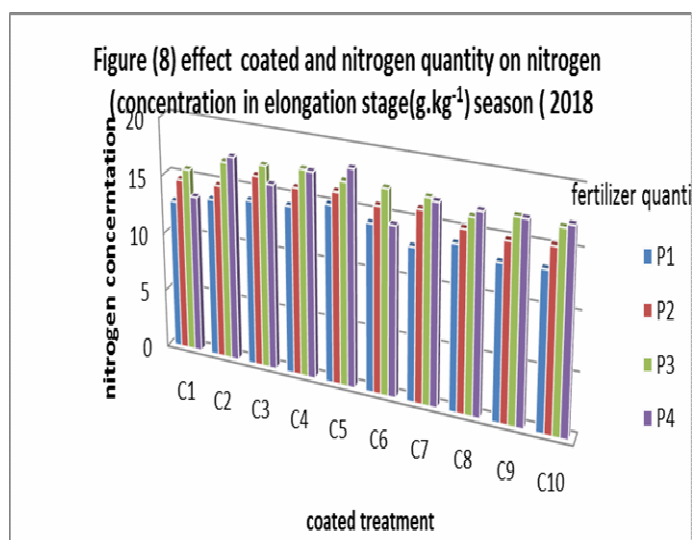


Elongation stage

The result indicated figure(6) to high significant between quantity fertilizer and their effect on nitrogen concentration during elongation, the treat P3 was superior in both season and give means 16.93 g.kg⁻¹ and 15.21 g.kg⁻¹ on sequences while treat P1 give lowest means 13.73 g.kg⁻¹ and 15.21 g.kg⁻¹ in both season, the superiority of treat P3 may attributed to that elongation stage it accompanied high needed to nitrogen so result that this treat provide efficiency of nitrogen assisted on superiority in this stage and that prove same treat in

seedling stage, this result consistence with the finding of Nash *et al.* (2008) and Ayoup *et al.* (2008) they mentioned increase nitrogen levels led to increase nitrogen concentration during elongation stage. The coated treatment was effected on increase nitrogen concentration that showed in figure (7), the result showed superiority treat C5 and give high means 16.72 g.kg⁻¹ and 18.03 g.kg⁻¹ in both season while treat C1 give lowest means 13.73 g.kg⁻¹ and 15.93 g.kg⁻¹ in both season, that cause my attributed this treat for sulfur coated and its role in low solubility and get slow release of nitrogen and this stage the nitrogen been from basic elements and important it come in construction organic compound it help in cell wall expansion so plant requirement for nitrogen will increase and when this treat capacity and ability for nitrogen preparation in enough quantity and in form can plant absorption proved on superiority in this character, this result consistence with the finding of Rajani and Aviji (2014) the refer to coated urea working on increase nitrogen concentration on wheat crop. The interaction between coated and quantity treatments was significant effect in first season figure (8) and the compound superior (P4*C5) and give high mean reach 18.36 g.kg⁻¹ while the compound (P1*C1) give lowest mean reach 12.75 g.kg⁻¹, the most coated treatment was superior with add fertilizer P3, that cause my attributed this compound to role positive between nitrogen quantity and type material used in coated its make low solubility and slow release nitrogen from that treatment during soluble that led to preparation quantity of nitrogen efficiency to absorption during interval elongation for wheat crop that give clearly increase in nitrogen concentration.





Booting stage

The result in figure(9) showed high significant in nitrogen concentration during boot stage, the treat P3 was superior and give high mean in both season was 19.92 g.kg^{-1} and 21.41 g.kg^{-1} while treat P1 give lowest mean 16.38 g.kg^{-1} and 17.85 g.kg^{-1} in both season, may reason attributed that treat to superior in seedling stag figure(1) and tillering stage figure(3) and elongation stage figure(6), the booting stage requirement high nitrogen levels and its absorption high quantity of nitrogen so the plant needed more dose of nitrogen to convert it to proteins, this result consistence with the finding of founded Ali *et al.* (2006), Yousaf *et al.* (2010) they refers to add fertilizer due increase nitrogen concentration in wheat crop. The processing of coated granules of urea with organic material it goal to provide nitrogen to longer period possible especially during important wheat growth, the result refer to high significant between coated treatment in figure(9) as superior treat C4 in both season and give means 19.46 g.kg^{-1} and 20.90 g.kg^{-1} while treat C1 give lowest means 16.38 g.kg^{-1} and 18.12 g.kg^{-1} in both season, may that superiority led to it superior in tillering stage figure (4) and efficiency in longer availability nitrogen during wheat growth with enough quantity starting from early stage to advanced stages of growth, this result consistence with the finding of Niu and Li (2012) they mentioned coated fertilizer urea due to increase protein content in boot stages. The result refers to high significant differences between fertilizer quantity and different coated treatment, the compound (P3*C3) was superior in first season and give higher mean 21.51 g.kg^{-1} while compound (P3*C4) give 23.02 in second season, the compound (P1*C1) give lowest means in both season reach 14.19 g.kg^{-1} and 16.29 g.kg^{-1} , the doses fertilizer with technology of coated granula with cellulos had due important role in nitrogen proved and its working to reduce nitrogen lose and on it uses higher dose possible from nitrogen.

Conclusion

The coated urea reduce nitrogen loses and making slow release nitrogen. The P3 was right level to prove plant with nitrogen in most growth period. Uses P3 with C4 was effective on most nitrogen concentration in wheat crop. That material use in coated processing have advanced to slow release nitrogen from granula coated.

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