

## The Interacting Effect of Using Urea with Fluazifop-P Herbicide on Increasing Growth and Controlling Weeds in Mungbean in the New Reclaimed Land.

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**Abstract:** Two field experiments were performed at summer seasons of 2006-2007 to study the promoting effect of using urea with Fluazifop -P ( fusilade) on increasing growth and controlling weeds in mungbean. The herbicide was applied alone (2 L/fed. as a recom. dose) and in combination (1, 1.5, and 2L) with urea (1, 2, 3%) as a post emergence application in comparison with two weedy check controls (unweedy treatment and hand hoeing twice). All treatments had a significant effect on increasing growth and yield productivity of mungbean in consequence with eliminating weed growth to a maximum. Not much significant differences were observed between using the 2L recommended dose and the different combinations with urea, particularly with the 3% combination. Positively, using Fluazifop-P plus urea at 1 L./fed and 3%, respectively was the best over all. In term of preserving environments and increasing crop yield this result could be impressing. Using hand hoeing was in the same perfection of the Fluazifop-P /urea chemical applications either for controlling weeds or increasing yield productivity. However, the edge between using either is governed by the economical cost of both of them. The carbohydrates, nitrogen and protein components were also increased in response of the different treatments and the most significant results were also reported with using Fluazifop-P plus urea at 1L and 3%, respectively. It has been concluded that using Fluazifop-P in aid of urea could be the key of eliminating the horrible quantities of using herbicides in controlling weeds in mungbean. We suggest fusilade plus urea at 1L/fed+3% for the best results that could be obtained at the healthy and the economical levels of using the herbicide.

**Key words:** Fluazifop-P (fusilade) ,growth,weeds,Mungbean and reclaimed land

### INTRODUCTION

Mungbean (*Vigna radiata* L. Wilczek) is one of the new hops of the developing countries (e.g., Egypt) to save nutrients for every one where these countries are suffering a lot from some kind of a big shortage of the elementary components of the nutrition particularly the protein. It is a summer pulse crop with a short duration (70-90 days) and high nutritive value. The seeds contain 22-28% protein, 60-65% carbohydrates, 1-1.5% fats, 3.5-4.5 fibers and 4.5-5.5% ash. The crop is common used in cooking using green and mature pods. The sprouts are rich in vitamins and amino acids. Today the seeds are highly appreciated in several activities. e.g., using in broilers diets as a non-traditional feeding stuff <sup>[1]</sup>.

The crop is useful for grazing and grazing is so benefit for the crop as it was estimated an abundance amount in seed yield in response <sup>[2]</sup>. It produces a large amount of biomass and recovers after cutting. As an intercropping crop, mungbean is wide implicated with maize, sorghum and between young trees (from different varieties and species) for four years prior to canopy closure <sup>[3-7]</sup>. It can also be used with cowpea

under rainfall conditions <sup>[8]</sup>.

All strategies and techniques of increasing yield and its components are, of course, guarantee good results. This including many, starting from controlling pests to using fertilizers and others of growth regulators. Weeds are one of such most important obstructed factors, and controlling them are meaning a lot on the way of increasing yield and yield productivity. Integrated weed management, the use of multiple approaches for controlling weeds including cultural, mechanical and chemical methods, are the way calling for such days. The FAO called upon its members to apply environmentally friendly integrated pest management methods and to drastically reduce the use of pesticides, where this is possible <sup>[9]</sup>. Fertilizers are an integral part of our society, they are used by farmers for increasing crop performance and hence quality and yield productivity of such plants. Their benefits could not be ignored at all. Applying nitrogen fertilizers, for instance, has a unique effect on enhancing the photosynthetic rate and of course the growth and yield are dramatically increase <sup>[10]</sup>. This was estimated on several legumes such as soybean and broad bean as well as mungbean where the present

study are interested with. <sup>[11-15]</sup>. Another possible application of chemical fertilizers which is recently emerged with increasing emphasis on reducing our great reliance on using synthetic herbicides that is related to using them in combination with the herbicides for increasing their performance and reducing quantity in the same time. El-Shahawy <sup>[16]</sup> found a magnificent role of using nitrogen- containing fertilizers such as urea and diammonium phosphate on increasing the herbicidal efficiency of bentazon and fusilade herbicides for controlling weeds associated with faba bean (*Vicia faba* L.). The author found 1% addition is the best over the others. Paradoxically, phosphorous fertilizers *i.e.* super phosphate, were not in the same action and of course are highly disregarded.

The aim of the present work was to study the beneficial effect of using urea on enhancing the herbicidal efficacy of Fluzifop-P herbicide on controlling weeds and increasing yield productivity of mungbean plant which recently brought to the countries and considered to be as a new hop for facing the big shortage of nutrition especially the protein component which already the peoples are suffering from.

#### MATERIALS AND METHODS

Field experiments were performed at the summer seasons of 2006 and 2007 in El-Nagah village, south El-Tahrir district, El-Behera governorate, Egypt to study the suspected effect of adding urea to Fluzifop-P-butyl ester [2-(4-(5- trifluoromethyl-2-pyridyloxy) phenoxy) propionate] ; (fusilade 25%) on controlling weeds and increasing yield quality and productivity of mungbean plants. The mungbean (*Vigna radiata* L. Wilczek, c.v. Kawmy-1) seeds were purchased from Field crops Research Department, National Research Center, Egypt. The seeds were sown in the 2<sup>nd</sup> week of May each season at three cm depth of the soil surface after inoculation with the specific strain of *Rhizobium leguminosarum*. The soil texture was sandy soil (EC=0.70 m mhos/cm<sup>3</sup>) with pH 8.1 and poor in nutrients estimated by 4, 1.7 and 6.2 mg/100 g soil of NPK respectively, in addition to 0.7% organic matter, and 3.15 % Ca Co<sub>3</sub>. The emerged plants were watered and fertilized according to the recommendations. The plants received 20 kg/fed nitrogen as ammonium nitrate (33%), and 24 kg/fed potassium as potassium sulphate 48%. Phosphorous (31 kg/fed) was added as calcium super phosphate 15.5% just before tilling the soil. The experiment was laid out in a completely randomized block design with four replicates for each treatment. Each experimental plot was in 10.5 m<sup>2</sup> in total, consisting of 5 ridges, each about 3m length in 0.70 m width.

The plants were sprayed with Fluzifop-P herbicide

either alone (2 L/fed., *e.g.*, the recommended dose) or in combination (1, 1.5, 2 L/fed.) with urea (1, 2, 3%; equal 1.84, 3.68 and 5.52 Kg N/fed., respectively) as a foliar application treatment; unweeded and hand hoeing twice treatments were used as controls. Hand hoeing was conducted after 4 and 6 weeks of sowing. After 2 months of the treatment, weeds growth and mungbean as well were checked taken the plant height (cm), number of branches per plant, number of leaves per plant, and the fresh and dry weights (g) as growth indicators.

At harvest stage (90 days of sowing) the same characteristics of mungbean growth were estimated in addition to the yield and yield components *e.g.*, no. of branches/plant, no. of pods/plant, no. of seeds/plant, seed index, seed yield (g/plant & kg/fed., each), biological yield (kg/fed), and harvest index. The seed content of nitrogen, protein and carbohydrate components were also determined following the Chapman and Pratt's technique <sup>[17]</sup>.

All data were subjected to the standard analysis of variance using LSD at 5% and means value according to Gomez and Gomez <sup>[18]</sup>.

#### RESULTS AND DISCUSSION

The effect of applying the different treatments on the growth and development of mungbean and its associated weeds by their categories broad and narrow leaves at 60 days of growth are shown in Table (1). The weeds in the site of the experiment were estimated as *Echinochloa colonum*, *Dinebra retroflexa*, and *Cynodon dactylon* as narrow leaves, and *Xanthium pungens*, *Amaranthus cruentus*, and *convolvulus arvensis* as broad leaves. Seem to be all treatments have a distinct effect on increasing the mass vegetative growth of mungbean plants in response to reducing the growth vigor of associated weeds. The data revealed that there is no much significant differences were found between applying Fluzifop-P alone (2 L/fed.) and applying it in combination with urea at either of the three concentrations been used (1, 1.5, and 2 L/fed). Using Fluzifop-P in combination with urea at 1 L/fed and 3% of the later is the best over all in terms of safety and reducing pollution into the environments. The data recorded 69.12 to 70.70% decreasing in weed growth for applying Fluzifop-P plus urea at 1 L/fed + 3% in comparison with 69.69-72.35% for applying Fluzifop-P alone at 2 L/fed. In consequence, mungbean was increased in growth including all parameters under investigation, particularly the number of branches/plant. Hand hoeing twice was in the same sequence of reducing weed and increasing crop vigor as much as the different of chemical applications, the herbicide alone or in combination with the urea.

**Table 1:** Effect of the different weed control treatments on mungbean growth and associated weeds at 60 days of sowing.

Treatments	Rate of application (L/fed.)	Mungbean growth			Weed growth					
		Plant height (cm)	No. of branches/plant	No. of leaves/plant	Fresh weight (g)			Dry weight (g)		
					Broad leaves	Narrow leaves	Total weeds	Broad leaves	Narrow leaves	Total weeds
Fusilade (alone)	2.00	65.00	2.04	13.00	40.00	20.00	60.00	4.00	2.00	6.00
Fusilade + urea	1.00 + 1%	59.00	2.28	14.80	51.00	30.00	81.00	5.00	2.60	7.60
Fusilade + urea	1.00 + 2%	62.00	3.00	16.60	55.00	24.00	79.00	4.30	3.00	7.20
Fusilade + urea	1.00 + 3%	74.00	3.62	19.20	45.00	20.00	67.00	3.90	2.00	5.80
Fusilade + urea	1.50 + 1%	58.00	2.36	14.00	57.00	30.00	87.00	5.80	3.00	8.80
Fusilade + urea	1.50 + 2%	61.00	3.00	16.00	52.00	40.00	92.00	5.00	4.00	9.00
Fusilade + urea	1.50 + 3%	71.00	3.36	18.40	58.00	40.00	98.00	5.20	4.00	9.20
Fusilade + urea	2.00 + 1%	59.00	2.00	14.00	41.00	20.00	61.00	4.80	3.00	7.80
Fusilade + urea	2.00 + 2%	60.00	2.58	16.00	56.00	20.00	76.00	4.40	3.00	7.40
Fusilade + urea	2.00 + 3%	69.00	3.00	18.00	35.00	30.00	65.00	4.00	3.00	7.00
Hand hoeing twice		73.00	2.42	15.00	30.00	28.00	58.00	4.00	2.90	6.80
Control (unweeded)		55.00	1.00	10.20	152.00	65.00	217.00	12.00	7.80	19.80
LSD (5%)		1.69	0.02	1.35	8.25	1.94	44.00	1.09	0.418	4.60

These results were in conformity with those obtained by the different researchers. El-Shahawy <sup>[16]</sup> explained that using nitrogen- based fertilizers has the most significant results (in comparison with the others of phosphorous ones) on increasing the herbicidal efficiency of Fluzifop-P and bentazon (herbicides) for controlling weeds aggressively invade faba bean growth. The pesticides manual has approved the possibility of using nitrogen fertilizers in corporation with synthetic herbicides for more efficacious could be obtained on eliminating weed growth <sup>[19]</sup>. Rather than the possible action of urea (or in its right meaning nitrogen fertilizers) on increasing the herbicides' penetration or chemically altering the herbicide's molecule to more potent form as they thought to be acting through <sup>[20,21]</sup>. there is another way certainly has a positive role on what already noticed on increasing the mass vegetative growth of our main target crop (mungbean) in this stage of growth (60 days old). The nitrogen molecule itself has a magnificent role, documented very well over years of research, on increasing growth and yield productivity of the crops. Increasing the metabolic process within the plants is a general meaning of what possibly could be happened; increasing the photosynthetic rates is more precise meaning of what exactly could be done in this regard <sup>[14,15]</sup>.

Obviously, the different treatments significantly increased the yield and its components at all the different rates and criteria have been studied (Table 2). Using Fluzifop-P in combination with urea under the different rates of concentrations still to be in similar position of applying it alone under the recommended concentration estimated by 2 L/fed. Again Fluzifop-P at 1 L plus urea at 3% is the best over all as compared with the control. The data estimated in this regard 38.73% increasing in seed yield/plant with applying Fluzifop-P and urea at 1 L + 3%, respectively in comparison with 23.89% for applying the 2 L recommended dose alone. That was a good result not only at the level of promoting seed yield/plant or reducing the cost of the agricultural process but in term of preserving environment and public health it highly appreciated. This could be explained in term of the point discussed above of reducing weed growth. As it is established, as long as the weed growth was determined the crop will be in its best form of growth and productivity. The matter has a direct correlation with the competition and reducing it to the minimum (as determined in the present study) would be of course pouring in the benefit of the crop. The researches on investigating nitrogen fertilizers as an effective tool of increasing growth and yield productivity of the crops particularly the legumes as

**Table 2:** Effect of the different weed control treatments on the yield and its components of mungbean plants

Treatments	Rate of application (L/fed.)	Plant Height (cm)	No. of			Seed index	Seed yield g/plant	Seed yield kg/fed	Biological yield Kg/fed.	Harvest index
			Branches/ plant	Pods/ plant	Seeds/ plant					
Fusilade (alone)	2.00	76.00	4.00	24.66	200	28.30	7.00	640.60	2557	0.250
Fusilade + urea	1.00 + 1%	70.00	4.30	26.66	203	29.30	7.46	630.00	2523	0.250
Fusilade + urea	1.00 + 2%	73.00	5.00	29.66	220	30.60	8.00	653.30	2587	0.252
Fusilade + urea	1.00 + 3%	85.00	5.60	33.00	235	32.30	8.13	676.60	2637	0.256
Fusilade + urea	1.50 + 1%	69.00	4.30	26.00	200	29.30	7.30	626.60	2507	0.250
Fusilade + urea	1.50 + 2%	72.00	5.00	29.00	213	30.00	7.90	646.60	2580	0.257
Fusilade + urea	1.50 + 3%	82.00	5.30	32.66	232	32.00	8.13	670.30	2599	0.257
Fusilade + urea	2.00 + 1%	76.00	4.00	24.66	200	28.30	7.00	640.60	2557	0.250
Fusilade + urea	2.00 + 2%	70.00	4.00	24.33	198	28.60	7.23	623.30	2507	0.248
Fusilade + urea	2.00 + 3%	71.00	4.60	28.33	210	30.00	7.66	643.30	2546	0.252
Hand hoeing twice		85.00	5.00	24.00	225	28.00	7.26	596.60	2433	0.245
Control (unweeded)		64.00	1.33	16.00	160	26.00	5.85	457.30	1820	0.251
LSD (5%)		5.46	0.812	2.38	11.52	1.44	0.91	26.53	71.16	0.12

**Table 3:** Effect of the different weed control treatments on the carbohydrates, nitrogen and protein components of the mungbean yielded seeds

Treatments	Rate of application (L/fed.)	Carbohydrates(%)	Nitrogen (%)	Protein (%)
Fusilade (alone)	2.00	48.80	4.10	25.26
Fusilade + urea	1.00 + 1%	49.88	4.00	25.00
Fusilade + urea	1.00 + 2%	48.62	4.23	26.43
Fusilade + urea	1.00 + 3%	47.60	4.51	28.20
Fusilade + urea	1.50 + 1%	49.58	4.00	25.00
Fusilade + urea	1.50 + 2%	48.00	4.28	26.75
Fusilade + urea	1.50 + 3%	46.88	4.56	28.50
Fusilade + urea	2.00 + 1%	49.00	4.10	25.62
Fusilade + urea	2.00 + 2%	49.40	4.00	25.00
Fusilade + urea	2.00 + 3%	48.50	4.23	26.43
Hand hoeing twice		48.80	4.10	25.62
Control (unweeded)		46.00	3.72	23.25
LSD (5%)		0.51	0.03	0.12

soybean, broad bean and mungbean are numerous. They have a unique effect on increasing mass vegetative growth, and increasing yield productivity was a common case in between all the studies have dealing with such point of concern <sup>[11-15]</sup>.

Hand hoeing was also effective and was in the same trend of action as much as the different of chemical applications including Fluazifop-P and urea applied either alone or in combination.

In between results, we can characterize the number of branches/plant as the most affected in comparison with the others, irrespective of the rate or the type of treatment has been used.

Regarding the effect on carbohydrates, nitrogen and protein components of the yielded seeds of the different treatments, the data revealed of no particular effect on increasing any of the three components been studied (Table 3). Slightly Fluazifop-P (1L) plus urea (3%) were the best in comparison with the others.

Thus it has been concluded that using Fluazifop-P in aid of nitrogen fertilizers *i.e.*, urea is possible for several reasons of increasing efficiency and/or eliminating the huge quantity of the herbicides have been used on our foods and environments. The authors are highly recommended Fluazifop-P plus urea at 1 L/fed and 3% of the later for the most significant results could be obtained on increasing yield and eliminating growth of associated weeds of mungbean crop.

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