

# Impact of Mahalaabh Foliar Fertilization on Growth and Yield of wheat (*Triticum aestivum* L.) in Field Conditions

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**Abstract**—Experiment was conducted on wheat (*Triticum aestivum* L.) at research farm, Lokbharati Sanosara (Gujarat) in rabi-2015-16 with popular cultivar Lok-1. The Mahalaabh was applied as foliar spray with high volume sprayer. The first spray was given at 60 days after sowing when wheat was at maximum flowering stage. This was followed by two more sprays as per treatments with 10 days interval. Application of Mahalaabh at 3.75 and 2.5 kg/ha during 60, 70 and 80 DAS of wheat, produced significantly higher crop yields of 5793 and 5708 kg/ha respectively as well as economic returns than untreated control. Mahalaabh at 3.75 and 2.5 kg/ha three sprays gave maximum net profit/ha with 59993 and 58949 ₹ respectively. Lowest gross and net returns of 91226 and 47606 ₹ ha<sup>-1</sup> were accrued under untreated control. So, Mahalaabh is useful for better yield as well as plant resistance towards biotic and abiotic stress.

**Keywords:** Mahalaabh, wheat, K, Mg, S and yield.

## 1. INTRODUCTION

Crop production can be improved by adding plant nutrient. Soil fertility often does not support optimum growth and yield due to lack of or low doses of specific nutrients. Sixteen plant food nutrients are known to be essential for proper development of crop. Each one is equally important to the plant and yet each is required in vastly different amounts. Soil nutrients depletion problem is a growing issue in intensively cultivated soils seriously affecting crop production and threatening food security. In order to sustain high crop yield and maintain a better soil fertility, the nutrient depletion from soil must be replenished. However as indicated above, according to widely used current practices, farmers generally apply nitrogen and phosphorus fertilizers and do not pay attentions to the depleted nutrients in the soils that lead to an imbalance nutrition of plant and decline in soil fertility. This is well documented problem in south Asia and China, resulting deficiency of potassium (K), sulphur (S), magnesium (Mg) and zinc (Zn) deficiency in plants (Cakmak, 2002, Ladha *et.al.*, 2003). In India, the deficit between the removal and applied nutrients is estimated to be reaching 5 x 10<sup>6</sup> t in soil

subjected to monotonous wheat and rice cultivation (Singh, 1998).

The K, Mg and S have particular role in plant metabolism and in improving nutritional quality of the edible part of crop plant (Marschner, 1995). K and Mg have critical function in photosynthesis, phloem loading of sucrose and biomass distribution among the plant parts (Cakmak, 2005, Harmans *et. al.* 2006). When plant suffer from K and Mg deficiency, translocation of photo assimilated from leaves to actively growing plant parts is severely reduced leading to reduced plant growth. More precisely, the technology based on the experimentation is more stable and reliable to transfer information to the farmer if the conclusions drawn are on the basis of repeated experimentation over year at the same place and on the same farm.

In this study, field experiments have been established to study the roles of mineral fertilizer Mahalaabh containing K, Mg and S in wheat growth and yield at different interval spray.

## 2. MATERIAL AND METHODS:

The field trial has been conducted on wheat (*Triticum aestivum* L.) at research farm, Lokbharati Sanosara (Gujarat) in rabi-2015-16. The popular cultivar Lok-1 was sown on 8 X 30 m<sup>2</sup> plot in randomized block design with three replications and six treatments of \*Mahalaabh at different interval after flowering and one untreated control as given in Table 1. All standards and recommended package of practices like tillage, spacing, manuring, irrigation and protection control were followed for the cultivation of crop. The Mahalaabh were applied as foliar spray with high volume sprayer. The first spray was given at 60 days after sowing when wheat at maximum flowering stage. This was followed by more sprays as per treatments with 10 days interval. Observations on plant height were recorded 15 days after last spray with 20 plants were selected randomly from each plot. The crop was harvested at maturity, 120 days after sowing. To examine

effect of the treatments on growth and yield of wheat from different plots, data has been analysed through analysis of variance (ANOVA).

**\*Mahalaabh** (Agrocel Industries Pvt. Ltd.) content:  $K_2SO_4.MgSO_4.6H_2O$ -Potassium Schoenite

( $K_2O$ :23% and  $MgO$ :11%)

Mahalaabh made by physical extraction method or by direct removing impurities from sea water. It is a unique source of plant nutrition since three essential nutrients are naturally combined in to one mineral and easily water soluble. It provides readily available supply of K, Mg and S to growing plant in ideal ratio.

### 3. RESULT AND DISCUSSION:

The result of Mahalaabh field experiment revealed that the plant stand and final yield of wheat increased due K, Mg and S enriched fertilizer Mahalaabh foliar application at maximum flowering stage of wheat with recommended dose of fertilizer. As the results clearly denote the effect of Mahalaabh over untreated control and found their significantly superior effect in case of wheat yield. Among various treatments 3.75 kg Mahalaabh/ha spray at 60, 70 and 80 DAS application resulted into significantly highest grain yield with 5793 kg/ha closely followed by application of 2.5 kg Mahalaabh/ha spray at 60, 70 and 80 DAS with 5708 kg/ha. The overall increase in crop growth and yield might be due to supplemental application of Mahalaabh which provides K, Mg, and S instantly through leaf as its flowering and grain filling stage. Mahalaabh application generally resulted in increases in root yield and improved leaf concentrations of K, Mg, and S. Similar type of work and finding are reported by Singh, (1998) and Hermans *et al.*, (2006).

The economics of treatment higher gross and net returns of 106274  $\square$  and 59993  $\square$  ha<sup>-1</sup>, respectively arises from 3.75 kg Mahalaabh/ha spray at 60, 70 and 80 DAS and followed by 104744 and 58949  $\square$  ha<sup>-1</sup> applications of 2.5 kg Mahalaabh/ha spray at 60, 70 and 80 DAS. Lowest gross and net returns of 91226 and 47606  $\square$  ha<sup>-1</sup> were accrued under untreated control. Similar trend of above treatments reflected in case of additional income/ha over control and ICBR. The economics of treatment higher gross and net returns of 106274  $\square$  and 59993  $\square$  ha<sup>-1</sup>, respectively arises from 3.75 kg Mahalaabh/ha spray at 60, 70 and 80 DAS and followed by 104744 and 58949  $\square$  ha<sup>-1</sup> applications of 2.5 kg Mahalaabh/ha spray at 60, 70 and 80 DAS.

**Table 1: Response of wheat to foliar fertilization and economics of Mahalaabh in field conditions**

Treatments	*Plant height (cm)	*Yield (Kg/ha)	**Gross income/ha ( $\square$ )	Additional income/ha over control ( $\square$ )	Total cost of cultivation ( $\square$ )	Net profit ( $\square$ )	ICBR
<b>T1:</b> 2.5 kg Mahalaabh/ha spray at 60 DAS	93.66	5377	98786	7560	44345	54441	1:2.22
<b>T2:</b> 2.5 kg Mahalaabh/ha spray at 60 & 70 DAS	94.52	5666	103988	12762	45070	58918	1:2.30
<b>T3:</b> 2.5 kg Mahalaabh/ha spray at 60, 70 & 80 DAS	95.35	5708	104744	13518	45795	58949	1:2.28
<b>T4:</b> 3.75 kg Mahalaabh/ha spray at 60 DAS	94.44	5419	99542	8316	44507	55035	1:2.23
<b>T5:</b> 3.75 kg Mahalaabh/ha spray at 60 & 70 DAS	95.68	5458	100244	9018	45394	54850	1:2.20
<b>T6:</b> 3.75 kg Mahalaabh/ha spray at 60, 70 & 80 DAS	95.78	5793	106274	15048	46281	59993	1:2.29
<b>T7:</b> Untreated control	93.21	4957	91226	-	43620	47606	1:2.09
<b>S.Em.</b>	<b>28.14</b>						
<b>C.D.</b>	<b>87.23</b>						

**Design : RBD**

**\*Average of three replications.**

**\*\*Selling rate of wheat @ 1800Rs/qt. April 2016– APMC Palitana.**

Lowest gross and net returns of 91226 and 47606  $\square$  ha<sup>-1</sup> were accrued under untreated control. Similar trend of above treatments reflected in case of additional income/ha over control and ICBR. From the table it can be clearly observed that frequent spraying of Mahalaabh at either at 3.75 or 2.5

kg/ha increases the profitability of crop. Overall nutrient supplement during its critical requirement results in to higher crop yield and were reflected against their economics. So, Mahalaabh is useful for better yield as well as plant resistance towards biotic and abiotic stress.

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