

Investigating the Effectiveness of Micropower Foliar Spray on Growth and Yield of Different Crops

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Abstract

Availability of micronutrients, except Mo is low in the soils of Pakistan. It is mainly because almost all soils are alkaline, calcareous, and low in organic matter. One of the possibilities to overcome these deficiencies is to feed these elements through leaves. Micro power is a multi-nutrient containing foliar spray (Zn, B, Fe, Cu, Mn, Mo, and Cl) blended with organic extracts (seaweeds extract). The interactive effect of micronutrients and extract enhances the crop yields. Application of micro power stimulated the early panicle/ spike initiation and number of tillers in rice and wheat. Its application in combination with recommended doses of NPK improved yields by 102 and 298% over control and 18 and 39% over NPK fertilizer alone in rice and wheat, respectively. Its response was also positive in cotton and 16-19% more fruiting bodies were recorded at Khanewal and Multan. Over all, results indicated positive effect of micro power on rice, wheat, and cotton crops.

Key words: Effectiveness, Micropower foliar spray, Micronutrient, Wheat, Rice, Cotton

Introduction

Micronutrients are as essential for plant growth as macronutrients. Deficiency of any one micronutrient adversely affects plant growth through reduced and dull coloured leaves, less flowering and fertilization. This all ultimately results in lower crop yields (Tisdal and Nelson, 1993). Like macronutrients, soils of Pakistan are also being depleting in micronutrients (NFDC, 1998). This is mainly due to two reasons, one is farmers ignorance while other includes soil and agro-ecological conditions such as alkaline and calcareousness of soils, low organic matter content, intensive cropping system, use of micronutrients free NPK fertilizers, cultivation of high yielding varieties, nutrient antagonism and electro-chemical changes under flooded conditions (Rashid and Rafique, 1997; Tisdal and Nelson, 1993; NFDC, 1998).

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Deficiencies of Zn, B, and Fe are identified on economic and field scale in most of soils under major crops (Sillanpaa, 1982; Khattak, 1995; Rashid, 1996). If current situation is not handled carefully, it would be resulted in sever deficiencies of other micronutrients also.

Although total micronutrient contents in soils are for greater but deficiencies occur because of their low availability to plants. In Pakistan, soil conditions and agronomic practices are conducive to deficiencies of micronutrients in plants. Methods suggested to overcome these deficiencies are application of these nutrients through soil, foliar or irrigation. Of these methods, foliar feeding is considered an efficient and economical technique because of more uniform distribution and quick response. This is also particularly true where soils are calcareous, alkaline in reaction and low in organic matter content. Under these conditions availability of soil applied micronutrients to plants is a problem. More over, all most all the micronutrients have antagonistic behaviour with each other.

Keeping the above facts in view, a multi-nutrients containing foliar spray is prepared under the name of "MICROPOWER". This spray is blended with organic extracts (as an appetizer) that enhance the photosynthetic activity, cell division and absorption of nutrients through leaves and roots. MICRO POWER was tested on various crops through out Punjab. Results on rice, wheat and cotton are discussed in this paper.

Materials and Methods

Field experiments were conducted to test the performance of MICRO POWER on rice, wheat and cotton. Rice nursery cv. Basmati 385 was sown on June 6, 2002. A field was prepared for seed-bed and cut into 5m x 5m plot size. The soil was sandy clay loam in texture, calcareous and alkaline in reaction and low in organic matter. One month old nursery was transplanted by maintaining 22.5cm*22.5cm hill to hill distance. The experiment was laid out according to randomized complete block design for four treatments (control, micro power spray alone, recommended NPK fertilizer alone and recommended NPK fertilizer + micro power spray).

Each treatment was repeated three times. Nitrogen @ 100 kg/ ha as urea, P₂O₅ @ 90 kg/ ha as SSP and K₂O @ 60 kg/ ha as MOP were applied at sowing time except nitrogen. Half of the N was applied at sowing time while other half after one month of transplanting. Micro power solution was diluted into 1:1000 and sprayed on plants after three weeks of transplanting. Micro power was comprised of Cl = 355, B = 271, Zn =340, Mn =110, Cu = 127, Mo = 50, and Fe = 240mg/ L. The solution was blended with organic extract that is known to increase the absorption of nutrient through leaves and roots. Number of panicle emerged were noted after two months of transplanting. Crop was harvested on November 3 , 2002.

Wheat variety Inqlab 91 was sown with the help of hand drill on November 25, 2002. Rate, time and method of application of fertilizer were same as in case of rice. Micro power (dilution 1: 1000) was sprayed after three weeks of germination. Visual observations on spike emergence and plant and health were noted. Crop was harvested on May 2, 2003 and data on grain and straw yield were recorded.

Experiments on cotton were conducted at CCRI, Multan and Seed Farm, Perowal, Khanewal. Effectiveness of micro power at same dilution was tested with and without fertilizers. Data on number of bolls and weight were recorded.

Results and Discussion

A lot of foliar sprays are used with different names on almost all crops. However, most of these sprays lack scientific back ground. An attempt was made to prepare a cheaper with scientifically sound base. Effect of micro power was tested on rice, wheat and cotton at various locations. Results indicate varying response of different magnitude. Data regarding the effect of micro power on rice and wheat crops (Tables 1&2) showed positive effect of micro power on growth and yield of rice and wheat. Early

emergence of panicle/ spike is a parameter to achieve target yield because it leads to the full development of grain. Single spray of micro power significantly enhanced the early emergence of panicle in rice and spike in wheat as is clear from the data in Table 1&2. About 2-fold more fertile tillers were observed in rice (40%) compared to alone NPK application (17.5%) and this figure was 3-fold in wheat (45%) compared to NPK application (12.5%) after two months of growth period. Similarly about 9% and 15% more tillers m⁻² were noted in rice and wheat, respectively compared to alone NPK application. Ultimate yield comparison also confirmed the above mentioned increase in tillers. About 102 and 298% increase in paddy/ grain yield over control were recorded in rice and wheat, respectively. However, in comparison with NPK application, this increase was 18 and 39%, respectively. Micro power alone also significantly increased the straw and grain yield over control. These results were also confirmed by applying this foliar spray on about 90 acres of rice and 58 acres of wheat sown fields near Jaranwala where more than 15% increase in yield was reported by the farmer.

Micro power was also applied on cotton crop at CCRI, Multan and Seed Farm, Perowal, Khanewal. Data on fruiting bodies were collected on August 23, 2003 at Multan and on September 12, 2003 at Perowal. Differences in number of fruiting bodies at both the places were observed. On an average micro power increased fruiting bodies by about 16-19% over NPK alone at both the places. The critical observation of crop showed a good crop stand and presence of first boll almost at each fruiting branch in the treatments where micro power solution was applied. Alone application of foliar spray also increased the fruiting bodies. However interactive effect increased more. These results indicate effectiveness of micro power alone and in combination.

Table 1: Effect of micro power on growth and yield of rice crop (2002).

Treatment	Early panicle emergence (%)	No. of tiller (m ⁻²)	Straw yield (kg ha ⁻¹)	Paddy yield (kg ha ⁻¹)	Increase in paddy yield over control (%)
Control	7.5 c	156.3 d	4368 d	1291 d	-
Micro power alone	13.7 b	206.3 c	5500 c	1500 c	16.18
Rec. NPK alone (100-90-60 kg/ ha)	17.5 b	303.8 b	6664 b	2204 b	70.72
Micro power + Rec. NPK	40.0 a	331.2 a	7409 a	2609 a	102.09 (18.37)

Means sharing the same letter do not differ significantly at 5 % probability.

Table 2: Effect of micro power on growth and yield of wheat crop during 2202-03.

Treatment	Early spike emergence (%)	No. of tiller (m ⁻²)	Straw yield (kg ha ⁻¹)	Grain yield (kg ha ⁻¹)	Increase in grain yield over control (%)
Control	8.7 c	240.0 d	2900 d	1260 d	-
Micro power alone	15.0 b	293.3 c	3690 c	1815 c	44.04
Rec. NPK alone (100-90-60 kg/ ha)	12.5 b	399.0 b	6150 b	3600 b	185.71
Micro power + Rec. NPK	45.0 a	458.5 a	6850 a	5015 a	298.01 (39.30)

Means sharing the same letter do not differ significantly at 5 % probability.

Table 3: Effect of micro power on fruiting bodies of cotton crop in 2003 at CCRI, Multan.

Treatment	Number of open bolls	No of close bolls	Number of flowers	Number of squares	Total / 4 plants	Average / plant	Increase over control
Control	66	186	18	146	416	104.00 d	-
Micro power	104	178	-	160	442	110.50 c	6.25
Rec. NPK	140	114	2	198	454	113.50 b	9.13
Micro power + Rec. NPK	47	250	20	212	529	132.25 a	27.16 (16.5)*

Means sharing the same letter do not differ significantly at 5 % probability.

* Percent increase over NPK fertilizer

Table 4: Effect of micro power on fruiting bodies of cotton crop in 2003 at Perawal.

Treatments	Number of open bolls	Number of close bolls	Number of flowers	Number of squares	Total / 4 plants	Average/ plant	Increase over rec. NPK (%)
Rec. NPK	113	334	29	167	643	160.75 c	-
Micro power	110	324	46	196	676	169.00 b	5.13
Micro power + Rec. NPK	91	374	54	248	767	191.75 a	19.28

Means sharing the same letter do not differ significantly at 5 % probability

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