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EFFECT OF FOLIAR SPRAY OF NUTRIENTS AND GROWTH REGULATORS ON THE SEED YIELD OF DHAINCHA [*SESBANIA ACULEATA* (WILLD.) PERS.]

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ABSTRACT

Green manuring is a feasible source of organic manure in dry land, which will enhance the availability of major nutrients to crops. Field experiment was conducted during 2020-21 to study the effect of foliar spray of nutrients and growth regulators on the seed yield of dhaincha in randomized block design with seven treatments replicated thrice. Significant increases were recorded in plant height, number of branches plant⁻¹, dry matter production and seed yield with foliar spray of (T₇) pulse wonder three times @ 1.125 % at 15, 30 and 45 DAS. maximum grain yield was recorded under the foliar spray of (T₇) pulse wonder three times @ 1.125 % at 15, 30 and 45 DAS and followed by (T₅) combined nutrients spray at 15, 30 and 45 DAS is the viable nutrient management package to the dhaincha for getting higher income through higher productivity.

Keywords: Foliar spray, Pulse wonder, *Sesbania aculeata*.

Introduction

The abundance and rapid increase in the use of non-renewable sources of chemical fertilizer in the last few decades in intensive agriculture led to decline in the use of organic sources like green manures, animal manures, compost, azolla *etc.*, Inorganic fertilizer is undoubtedly the fastest way to boost up crop growth, but long term use of inorganic sources leads to deterioration of soil physical and chemical properties. Moreover, the increases in cost of fertilizer, environmental pollution, consciousness and conservation of energy have created renewed interest in the organic farming. According to Palaniappan and Annadurai (1999), organic farming is a production system which avoids or largely excludes the use of synthetic compound like fertilizer, pesticides, growth regulators to the maximum extent and this system on crop rotations, crop residues, animal manures, legumes, green manures and off farming organic wastes to maintain soil productivity and to supply plant nutrients.

Foliar application of both essential nutrients and growth regulators also play a vital role in dhaincha seed production by stimulating root development, nodulation, energy transformation, various metabolic processes, translocation activity in plants and increasing pod setting, and thereby increasing the yield (Sankar, 2003). Foliar spray provides support to the crop to withstand moisture stress conditions by maintaining proper water potential in the plants. The poor partitioning efficiency coupled with flower drop and poor seed setting are the other serious problems, which adversely affect the yield of crop. Growth regulators is one of the

potent source for improving the growth, flowering and seed setting, seed quality and yield in dhaincha (Dhedhi *et al.*, 2017). Foliar application of growth of regulators reduced the flower drop and improved the pod formation and seed setting percentage in kidney bean (Mir *et al.*, 2010). Application of DAP and NAA as foliar spray significantly improved the yield attributing characters by reducing flower shedding resulted in increased number of pods per plant in green gram (Kunjammal and Sukumar, 2019).

Materials and Methods

A field trial was conducted in the ICAR-Krishi Vigyan Kendra field during cropping period June – September, 2020-21. The soil of the experimental field was sandy clay loam with a pH of 7.1 and EC 0.22 ds m⁻¹. Regarding the fertility status, the soil was classified as medium in available nitrogen (270 kg ha⁻¹), medium in available phosphorus (13 kg ha⁻¹) and medium in available potassium (233 kg ha⁻¹). The sugarcane variety Local was demonstrated for the study. The experiment was laid out in randomized block design and replicated thrice. Experiment consisting seven treatments with different nutrients and growth regulator viz., T₁- Recommended dose of fertilizer (RDF) alone, T₂ – RDF+ DAP 2 % at 15 and 30 DAS, T₃. DAP 2 % at 15, 30 and 45 DAS, T₄* Combined Nutrients Spray at 15 and 30 DAS, T₅- *Combined Nutrients Spray at 15, 30 and 45 DAS, T₆-Pulse Wonder @ 1.125 % at 15 and 30 DAS, T₇-Pulse Wonder @ 1.125 % at 15, 30 and 45 DAS.

*Combined Nutrients Spray: 2 % DAP + 1 % Urea + 1 % KCl + 40 ppm NAA.

Results and Discussion

Growth attributes

Growth and physiological parameters The significant increase in growth characters of dhaincha might be due to foliar spray of nutrient and growth regulator combination which play a major role in growth development and metabolism of dhaincha. Nutrient elements which are normally absorbed through roots can also be effectively absorbed through foliage. Foliar fertilization assumes greater importance because the nutrient is brought in the immediate vicinity of the metabolic area *viz.*, foliage without the process of being first mineralized in the soil, absorbed through the roots and then transported to the leaf for assimilation (Nayak, 2016). The physical, chemical and biological properties may also influence the availability of nutrient if it is applied through soil. Foliar spray of nutrients becomes handy when the crop is unable to adsorb nutrients from the soil due to non availability of a particular element because of fixation of that particular element (Dixit *et al.*, 2008).

In the current investigation also, the different foliar nutrition treatments and growth regulators application significantly enhanced the growth parameters of dhaincha. With regard to the plant height, Dry matter production and number of branches, the foliar spray of Pulse Wonder @ 1.125 % at 15, 30 and 45 DAS registered the higher plant height (109.5 cm) (Table 1) at all the stages of crop growth. The reason for higher plant height might be due to dhaincha's indeterminate growth habit with additional supply of major, micro nutrients and growth hormones through foliar spray. Similar results had also been reported by Hari Nayak *et al.* (2017).

Foliar spray of Pulse Wonder @ 1.125 % at 15, 30 and 45 DAS caused significant effect on higher dry matter production (6138 kg/ha) (Table 1). Higher dry matter production was due to combined influence of foliar application of macro and micronutrients on crop growth. Periodical spray of macro and micronutrients in the form of microsols might have increased the cytokinin content, which is known to delay leaf senescence resulting in longer retention of the effective photoassimilatory surface (Bhuker *et al.*, 2019). These results are in line with Kalpana and Krishnarajan (2003).

The foliar nutrition has significant influences on growth indices like number of branches per plant (Table 1). Foliar

spray of Pulse Wonder @ 1.125 % at 15, 30 and 45 DAS produced maximum and significant number of branches plant⁻¹ (9.3) at harvest. Crop production is determined by number of branches as a function of light interception by the leaf area of a crop and is influenced by leaf area index, photosynthetic rate and leaf angle. Interaction of phytohormones and nutrients on growth and development of crop plants cause positive responses on number of branches per plant. Dixit *et al.* (2008) stated that combined foliar application of 2 % DAP with 0.2 % boron and 0.05 % Mo at 30 DAS significantly registered higher plant height, branches and seed yield in mungbean.

Yield attributes

The foliar spray of Pulse Wonder @ 1.125 % 15, 30 and 45 DAS registered higher number of pods plant⁻¹, number of seeds pod⁻¹, pod length of dhaincha (Table 2). The increased pod number might be due to the supplementation of nutrients at the critical stage without stress and also due to increased number of floral buds, prevention of the floral shedding because of the spray of macro, micro nutrients and growth regulators. The higher number of pods plant⁻¹, number of seeds pod⁻¹ have been observed when nutrients were supplied to plants both through foliage and soil. Kunjammal and Sukumar (2019) also observed similar results.

The foliar spray of Pulse Wonder @ 1.125 % at 15, 30 and 45 DAS (T₇) registered the higher grain (Table 2) & haulm yield of dhaincha. Highest seed yield was obtained in treatments might be due to higher nutrient mobility for uptake and provided with all essential elements at the location where it needed in time. Similar results have been observed by Uma Maheswari *et al.* (2017).

Economics

Gross return, net return and returns per rupee invested were markedly influenced by various seed treatments and foliar spray practices. Among the different treatment Pulse Wonder spray @ 1.125 % at 15, 30 and 45 DAS had given the highest gross return, net return and B:C ratio (Table 3). The higher seed yield realized under these treatments more than compensated the cost for additional inputs could be reason for the higher gross income, net income and B:C ratio. Pulse Wonder spray @ 1.125 % at 15 and 30 DAS was found to be next best treatment combination in terms of economic parameters. The results were in confirmation with the results of (Bhuker *et al.*, 2019).

Table 1 : Effect of foliar sprays on growth attributing characters in Dhaincha.

Treatments	Plant height (cm)	dry matter production (kg/ha)	Number of branches plant ⁻¹ (No.)
T ₁ - Recommended dose of fertilizer (RDF) alone	74.0	4460	6.8
T ₂ – RDF+ DAP 2 % at 15 and 30 DAS	82.4	6065	7.0
T ₃ . DAP 2 % at 15, 30 and 45 DAS,	85.5	6467	7.2
T ₄ * Combined Nutrients Spray at 15 and 30 DAS,	88.8	5683	7.5
T ₅ *Combined Nutrients Spray at 15, 30 and 45 DAS,	101.4	5857	8.6
T ₆ -Pulse Wonder @ 1.125 % at 15 and 30 DAS,	95.0	5762	8.0
T ₇ -Pulse Wonder @ 1.125 % at 15, 30 and 45 DAS.	109.5	6138	9.3
SED	2.2	143	0.5
CD (0.05)	5.3	349	1.2

*Combined Nutrients Spray: 2 % DAP + 1 % Urea + 1 % KCl + 40 ppm NAA

Table 2 : Effect of foliar sprays on yield attributing and yield characters in Dhaincha.

Treatments	Number of pods plant ⁻¹	Number of seeds pod ⁻¹	Pod length (cm)	Haulm yield (kg/ha)	Seed yield (kg/ha)
T ₁ - Recommended dose of fertilizer (RDF) alone	30.8	24.5	16.2	3617	485
T ₂ – RDF+ DAP 2 % at 15 and 30 DAS	32.1	24.9	16.6	3832	504
T ₃ . DAP 2 % at 15, 30 and 45 DAS,	33.7	25.1	16.7	3986	586
T ₄ *-Combined Nutrients Spray at 15 and 30 DAS,	34.2	25.4	16.9	4060	579
T ₅ *-Combined Nutrients Spray at 15, 30 and 45 DAS,	37.8	27.0	18.1	4238	636
T ₆ -Pulse Wonder @ 1.125 % at 15 and 30 DAS,	36.2	26.2	17.1	4108	602
T ₇ -Pulse Wonder @ 1.125 % at 15, 30 and 45 DAS.	39.6	28.1	18.7	4525	683
SED	1.2	0.2	0.1	135	9
CD (0.05)	2.8	0.4	0.3	331	23

Table 3 : Effect of foliar sprays on Economics in Dhaincha.

Treatments	Cost of cultivation (₹ ha ⁻¹)	Gross income (₹ ha ⁻¹)	Net income (₹ ha ⁻¹)	B:C ratio
T ₁ - Recommended dose of fertilizer (RDF) alone	9175	19577	10402	2.13
T ₂ – RDF+ DAP 2 % at 15 and 30 DAS	10675	22884	12209	2.18
T ₃ . DAP 2 % at 15, 30 and 45 DAS,	10810	24575	13765	2.27
T ₄ *-Combined Nutrients Spray at 15 and 30 DAS,	10945	25432	14487	2.32
T ₅ *-Combined Nutrients Spray at 15, 30 and 45 DAS,	10825	27997	17172	2.59
T ₆ -Pulse Wonder @ 1.125 % at 15 and 30 DAS,	11822	29667	17845	2.51
T ₇ -Pulse Wonder @ 1.125 % at 15, 30 and 45 DAS.	11702	31452	19750	2.69

Data not statistically analysed

Conclusion

Hence it is concluded that foliar sprays with Pulse Wonder spray @ 1.125 % at 15, 30 and 45 DAS can be recommended in dhaincha seed crop for getting higher seed yield with higher B:C ratio. Foliar sprays with Pulse Wonder spray @ 1.125 % spray at 15, 30 and 45 DAS was found to be better compared to combined nutrients spray.

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