

RESPONSE OF FLOBOND DI 2010 ON ONION
DURING RABI SEASON

Submitted

to

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BY



**NATIONAL HORTICULTURAL
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**Report of
Sponsored
Trial**

Response of FLOBOND DI 2010 on onion during *rabi* season

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3	Name of Implementing Officer	Dr. P. Bhasker, T.O. (Plant Physiology) Shri. H.P. Sharma (Joint Director - Stat)
4	Name of Company	M/s SNF - India Pvt. Ltd., Plot No.19, Jawaharlal Nehru Pharma City, Parawada, Visakhapatnam- 531019, Andhra Pradesh – India
5	Product	FLOBOND DI 2010
6	Crop and Season	Onion and <i>rabi</i> , 2019-20
7	Type of study	Response of FLOBOND DI 2010 on onion during <i>rabi</i> season
8	Duration of experiment	Four months
9	Status of report	One season

INTRODUCTION

Onion (*Allium cepa* L.) is an important vegetable and one of the popular crop among all vegetables consumed. It requires a variety of elements for proper growth and development which are required relatively in large quantities. Drought is one of the major environmental factor depressing the plant growth and productivity worldwide. Among other environmental factors, drought is the most important limiting factor in field crop production, which contributing to 75% yield loses worldwide and imposes serious influences on growth and development of plants by causing numerous changes at the physiological, metabolic and molecular levels. Due to failure of the monsoons, causes water scarcity, resulting in lower average crop yields. India has experienced widespread drought every year since 2015, about 42% of India's land area is facing drought. India has received 36% less rainfall than the long term average between March 1 and March 28, 2019, as per IMD. Drought is particularly true of major drought prone regions such as southern and eastern Maharashtra, northern Karnataka, Andhra Pradesh, Telangana, Odisha, Gujarat, Bihar, Gujarat, Jharkhand, parts of the North-East, Rajasthan and Tamil Nadu.

Onion growth and yield depends mainly on good management of water and fertilization which is the most important factor affecting the productivity of onion. The use of drip irrigation is more effective in the application of water and nutrients. Water stress decreases plant growth and yield of crops higher than other harsh environment in arid and semiarid regions. Water stress reduces uptake of nutrients by onion roots and negatively affects root-shoot transfer of nutrients. Water management in sustainable agriculture tends to reduce the amount of irrigation water due to water scarcity and increasing the need of food production. The use of soil amendments and foliar application of bio fertilizers may enhance the water stress resistance of onion through minimizing the negative impact of drought and enhance yield and quality of onion bulb. M/s SNF - India Pvt. Ltd, Plot No.19, Jawaharlal Nehru Pharma City, Parawada, Visakhapatnam-531019, Andhra Pradesh – India has developed polyacrylamide polymers named as **FLOBOND DI 2010**. The FLOBOND is co-polymers of

polyacrylamide designed to enhance the infiltration performance in irrigation applications. FLOBOND is effective in increasing soil capillary flow both horizontally as well as vertically, which maximizes infiltration of water into the soil. FLOBOND improves the soil porosity and poorly structured soils by using polyacrylamide to prevent soil erosion and loss of nutrients. The cohesion of the soil is increased so that less sediment is entrained by water runoff. The result is an average reduction of 95% in erosion. To assess the impact of this FLOBOND DI 2010 on growth and yield of onion during *rabi*, 2019-20 at Nashik (Maharashtra), a sponsored trial was conducted with an objective;

Objective: To assess the response of FLOBOND DI 2010 on crop growth and yield of onion.

MATERIALS AND METHODS

The trial was conducted on onion variety NHRDF Red-4 during *rabi*, 2019-20 at Regional Research Station, National Horticultural Research and Development Foundation (NHRDF), Nashik (Maharashtra), India. The experimental site is located at an altitude of about 492 m mean sea level, latitude of 20° N and has longitude of 73° 57' E. The experiment was laid out in Paired-t test with twelve replications. The bed size was kept as 5.10 m x 1.2 m under drip irrigation. The 60-65 days old seedlings of onion variety NHRDF Red-4 were transplanted on 22.01.2020 and harvested at crop maturity on dated 06.05.2020. The experiment was comprised of the following two treatments;

T₁ Well-watered (19 irrigations) without FLOBOND DI 2010

T₂ Well-watered (19 irrigations or may be reduced as per soil moisture availability) with FLOBOND DI 2010 applied to the field @ 100 ppm through drip at transplanting, 2nd application @ 100 ppm at 30 DAT, 3rd application @ 100 ppm at 55 DAT

In treatment T₁ throughout cropping period uniform soil moisture was maintained is about 66.0 -67.0% and in treatment T₂ also equal moisture content was maintained throughout cropping period by reducing the 6 irrigations as compared to

treatment T₁ applied irrigations due to FLOBOND effect. The soil of experimental plot was deep heavy clay and the soil nutrient composition was analyzed before transplanting of the crop and the details are given in Table 1. During experimental period meteorological data has given in Table 2.

The observations were made on various growth and yield parameters. The obtained data was subjected to Paired-t test with significant differences at 5% level of significance.

Table 1 Initial properties of soil of experimental plot

Sr. No.	Parameters	Before transplanting of crop
1	pH	7.10
2	EC (dSm ⁻¹)	0.431
3	Organic Carbon (%)	0.850
4	Available Nitrogen (kg ha ⁻¹)	430.0
5	Available Phosphorus (kg ha ⁻¹)	123.62
6	Available Potash (kg ha ⁻¹)	784.0
7	Calcium Carbonate (%)	4.0
8	Available Calcium (ppm)	800.0
9	Magnesium (ppm)	480.0
10	Available Sodium (ppm)	161.0
11	Chloride (ppm)	15.90
12	Sulphur (mg kg ⁻¹)	33.37
13	Copper (mg kg ⁻¹)	2.131
14	Iron (mg kg ⁻¹)	9.778
15	Manganese (mg kg ⁻¹)	14.70
16	Zinc (mg kg ⁻¹)	1.298
17	Water holding capacity (%)	50.83

Table 2 Agrometeorological data during experimental period of RRS, Nashik, rabi, 2019-20.

Months	Temperature (°C)		Relative humidity (%)		Rainfall (mm)
	Max.	Min.	Max.	Min.	
January	22.66	8.80	68.35	44.65	-
February	25.19	11.23	67.31	52.62	-
March	31.22	12.35	43.55	30.23	-
April	32.81	17.78	49.23	29.43	-
May	34.82	21.70	50.06	30.16	-

RESULT

Growth parameters

The data presented in Table 3 revealed that the treatments did not influence significantly on all growth parameters. Comparatively, highest plant stands at 30 DAT (89.44%), 60 DAT (76.61%) and at harvest (70.16%) were recorded in treatment T₁ [Well watered (19 irrigations) without FLOBOND DI 2010]. The highest plant height (62.37 cm) and number of leaves (8.57/plant) were also recorded in treatment T₁. The lowest neck thickness (1.24 cm) at 75 DAT was recorded in treatment T₂ [Well watered (19 irrigations or may be reduced as per soil moisture availability) with FLOBOND DI 2010 applied to the field @ 100 ppm through drip at transplanting, 2nd application @ 100 ppm at 30 DAT, 3rd application @ 100 ppm at 55 DAT].

Yield and yield attributes

The data presented in Table 4 revealed that the yield parameters did influenced by treatments. Comparatively highest bulb equatorial diameter (5.14cm) and polar diameter (3.29cm) along with highest gross yield (349.54 q/ha) and marketable yield (323.26 q/ha) were recorded in treatment T₁. Significantly lowest doubles (1.47%) were recorded in treatment T₁ and the bolters showed non-significant results. However, the 30.77% of water saved in treatment T₂ as compared to treatment T₁ (Table 5).

CONCLUSION

The study conducted at RRS, Nashik on onion variety NHRDF Red 4 during *rabi*, 2019-20 revealed that the highest growth and yield was recorded in treatment well-watered (19 irrigations) without FLOBOND DI 2010, however, the 30.77% of water saved in the treatment well-watered (19 irrigations or may be reduced as per soil moisture availability) with FLOBOND DI 2010 applied to the field @ 100 ppm through drip at transplanting, 2nd application @ 100 ppm at 30 DAT, 3rd application @ 100 ppm at 55 DAT.

Table 3 Response of FLOBOND DI 2010 on various parameters of onion during *rabi*2019-20

Particulars	Plant stand at 30 DAT (%)		Plant stand at 60 DAT (%)		Plant stand at harvest (%)		Plant height (cm)		Number of leaves/ plant		Neck thickness (cm)	
	T ₁	T ₂	T ₁	T ₂	T ₁	T ₂	T ₁	T ₂	T ₁	T ₂	T ₁	T ₂
Mean	89.44	88.40	76.61	76.02	70.16	69.40	62.37	60.65	8.57	8.25	1.28	1.24
<i>SD</i>	5.75	12.60	9.92	12.98	10.24	13.53	2.71	2.33	0.79	0.44	0.06	0.06
<i>S.Em</i>	1.66	3.64	2.86	3.75	2.96	3.90	0.78	0.67	0.23	0.13	0.02	0.02
<i>N</i>	12	12	12	12	12	12	12	12	12	12	12	12
<i>P value</i>	0.74		0.91		0.89		0.13		0.34		0.08	
<i>Confidence Interval</i>	1.04		0.59		0.76		1.71		0.32		0.05	
<i>Tab. cal</i>	0.33		0.11		0.14		1.65		1.00		1.96	
<i>df</i>	11		11		11		11		11		11	
<i>Std. error</i>	3.11		5.21		5.41		1.04		0.32		0.024	

Table 4 Response of FLOBOND DI 2010 on yield and quality of onion during *rabi* 2019-20

Particulars	Equatorial bulb diameter (cm)		Polar bulb diameter (cm)		Gross yield (q/ha)		Marketable yield (q/ha)		Doubles (%)				Bolters (%)			
	T ₁	T ₂	T ₁	T ₂	T ₁	T ₂	T ₁	T ₂	T ₁		T ₂		T ₁		T ₂	
Mean	5.14	5.08	3.29	3.36	349.54	347.78	323.26	316.57	1.47	(1.39)	2.9	(1.83)	0.58	(1.03)	0.41	(0.95)
<i>SD</i>	0.20	0.18	0.17	0.17	20.32	46.02	24.13	42.95	0.62	(0.22)	1.03	(0.28)	0.26	(0.12)	0.08	(0.04)
<i>S.Em</i>	0.06	0.05	0.05	0.05	5.87	13.28	6.97	12.40	0.18	(0.06)	0.27	(0.08)	0.07	(0.03)	0.02	(0.01)
<i>N</i>	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12
<i>P value</i>	0.26		0.29		0.91		0.67		0.001				0.08			
<i>Confidence Interval</i>	0.07		0.08		1.76		6.69		-0.44				0.08			
<i>Tab. cal</i>	1.18		1.12		0.11		0.43		4.14				1.94			
<i>df</i>	11		11		11		11		11				11			
<i>Std. error</i>	0.06		0.07		15.4		15.44		0.11				0.04			

Table 5 Response of FLOBOND DI 2010 on number of irrigations of onion during *rabi* 2019-20

No of irrigations	Irrigation through drip in onion		
		Control - Without Flobond	With Flobond
	Date of irrigation	lit/h	lit/h
1	22/1/2020	4	4
2	27/1/2020	3	
3	31/1/2020	2	2
4	6/2/2020	4	4
5	10/2/2020	2	
6	16/2/2020	2	2
7	21/2/2020	3	
8	26/2/2020	3	3
9	2/3/2020	3	
10	7/3/2020	2	2
11	11/3/2020	2	
12	17/3/2020	3	3
13	23/3/2020	3	3
14	28/3/2020	3	3
15	1/4/2020	3	
16	6/4/2020	3	3
17	12/4/2020	3	3
18	16/4/2020	2	2
19	21/4/2020	2	2
Total No of hrs of irrigations		52.00	36.00
Saving of water in per cent in FLOBOND treated crop over control			30.77
Quantity of water applied to ha in cubic meter		6933.3 m³	4800.0 m³

Experimental Plot Photos



Plate 1 (a&b) Experimental area view.