

Enhancement in grain / fruit yield and water productivity with PBRs

Crop	Improvement in grain/fruit yield (%)	Water productivity, WP, (kg m ⁻³)
Wheat (cv HD-2189)	5.9-20.6	1.20-1.35
Sorghum (cv Phule Suchitra)	6.8-18.5	1.16-1.41
Soybean (cv JS-335)	4.2-14.2	1.02-1.12
Onion (cv Bhima Kiran)	10.1-25	7.8-9.6
Eggplant (cv Panchganga)	6.2-20.9	3.1-6.1

Impact and benefits

- ♦ The response of bio-regulators (PBRs) is highly specific crops and environment conditions

- ♦ In addition to enhancements in grain/fruit yield, these improved water productivity. For attaining normal yields, water saved equalled two irrigations in most of the crops tested.
- ♦ The PBRs like thio-urea (10 mM), sodium benzoate (100 mg L⁻¹), potassium nitrate (KNO₃) and salicylic acid (10 µM) helped to alleviate the water stress in wheat, sorghum, onion, soybean and eggplant, respectively
- ♦ PBRs further improved nutritional quality of vegetables
- ♦ Cost involved in PBRs application are economically viable
- ♦ On the whole, it is implied that integration of PBRs with deficit irrigation can not only enhance productivity and profitability of farmers but also the water saved should help in extending irrigated area especially under water-scarce conditions

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Sakalp



Bio-regulators

**For proving resilience to
agriculture under
water stress conditions**



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Introduction

- ◆ Amongst abiotic stresses, water deficits are the most common afflicting almost 68% of cultivated area in India
- ◆ To provide instantaneous relief to stressed plants, Low External Input and Sustainable Agriculture (LEISA) technologies are now gaining interest
- ◆ One of the principle components of LEISA is exogenous application of low concentration of chemicals termed as “Plant Bio-Regulators (PBRs)”
- ◆ PBRs help in boosting inherent mechanisms of plants for responding to stresses and therefore are proving as powerful tool in enhancing productivity, quality and ultimately the net income
- ◆ Accordingly long term field testing of different PBRs is progressing at CAR-NIASM.
- ◆ A line source sprinkler system (LSS) was designed to generate continuously variable water stress levels, depending upon the distance from the mains of the LSS
- ◆ Crops included so far are wheat, sorghum, soybean, onion and eggplant.

On the basis of field experiments undertaken so far, following crop/stage specific recommendations are emerging with respect to the doses and frequencies of PBRs

Wheat (*cv.* HD 2189)



Recommended PBR : Thio-urea

Application rate : 10 mM/litre

Growing stages for foliar application :

1. Crown root initiation (CRI, 20 DAS)
2. Flag leaf (42-45 DAS)
3. Seed milking stages (65 DAS)

Sorghum (*cv.* Phule Suchitra)



Recommended PBR : Sodium benzoate

Application rate : 100 mg/litre

Growing stages for foliar application :

1. Seedling elongation (20-25 DAS)
2. Reproductive (50 DAS)
3. Panicle formation (75 DAS)

Soybean (*cv.* JS-335)



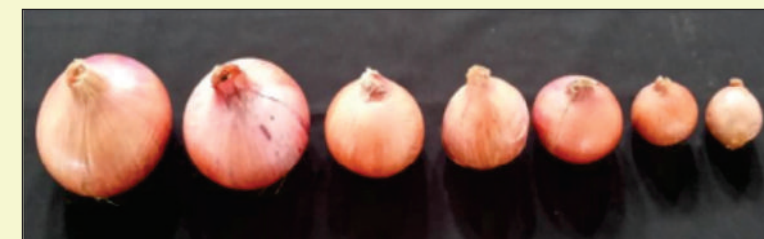
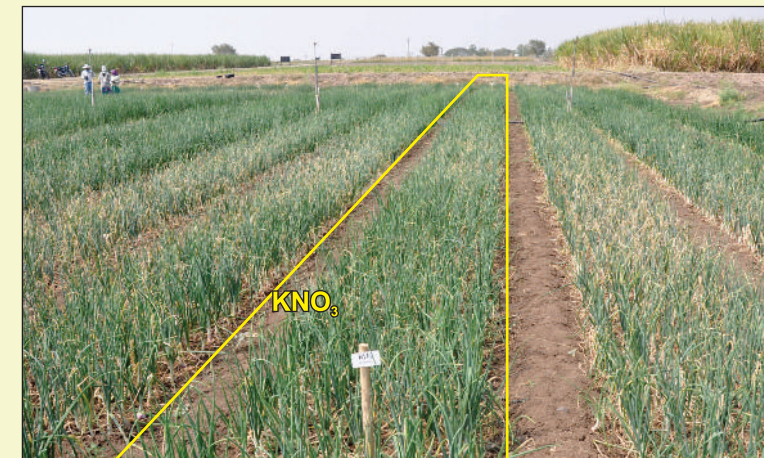
Recommended PBR : Salicylic acid

Application rate : 10 μ M/litre

Growing stages for foliar application :

1. Flowering stage (35 DAS)
2. Grain formation (55 DAS)

Onion (*cv.* Bhima Kiran)



Recommended PBR : Potassium Nitrate

Application rate : 100 mg/litre

Growing stages for application :

1. Vegetative (40 DAT)
2. Bulb initiation (60 DAT)
3. Bulb development (80 DAT)
4. Post development (100 DAT)

Brinjal (*cv.* Panchganga)

Recommended PBR : Salicylic acid

Application rate : 10 μ M/litre

Growing stages for foliar application :

1. 40 Days after transplanting (DAT)
2. 65 DAT
3. 95 DAT