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BIO SEED PRIMING: SUSTAINABILITY TOWARDS ECOSYSTEM, FARMERS & HUMANITY

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Bio-priming is an alternative way of chemical priming of seed. Nowadays, sustainability towards ecosystem, farmers and humanity is significant over unsustainable practices. Various microbes (e.g.- Plant growth promoting bacteria, Biophos etc.) are applied to well acquaint bio- priming. Maize, Sunflower, Ground nut, Bengal gram, Kidney bean are some of the successful bio- primed field crop. Ideas of organic farming also support bio-priming for humanity. Farmers are exhausted of applying excessive chemical for seed treatment, resulting into death of the seed tissue, hampering seed growth and affecting germination. Bio-priming is a effective approach to replace farmer harmful chemical practice. Overall ecosystem getting benefitted by bio-priming, helping seed for positive growth, enriching nutrient intake, high germination capacity, vegetative growth and ultimately enhancing yield and productivity. That is why we can say that,

“If Biopriming Is Possible, Then Our Ecosystem (**E**) and Humanity (**H**) Is In the Safe Hand of Farmer (**Art**) Who Are the Artist of Agriculture, Saving Our Mother **Earth**”

Bio seed priming is techniques of seed treatment with beneficial microorganisms (Bacteria, fungus, actinomycetes etc.) that may be improve seed health, seed quality, seed morphology. Biopriming is an alternative method of chemical priming. In simple words, biological contact with seed material is Biopriming. Biological contact can be fair for seed or may not be in the mean of beneficial or non-beneficial microbe contact. Seed generally attacked, damaged by seed borne pathogen (non-beneficial), controlled by Integrated Disease Management (combination of physical, biological, chemical management). But prevention is better than cure, therefore, at primary stage only if seed subjected to biopriming then seeds are getting force for growth, chances of seed borne pathogen becoming less. With this

approach, we are minimizing post disease management and also incrementing the flourishing energy of seed material resulting to high germination percentage.



Fig 1: Germinated Bioprimed Seed

Biopriming Diversification among Farmers

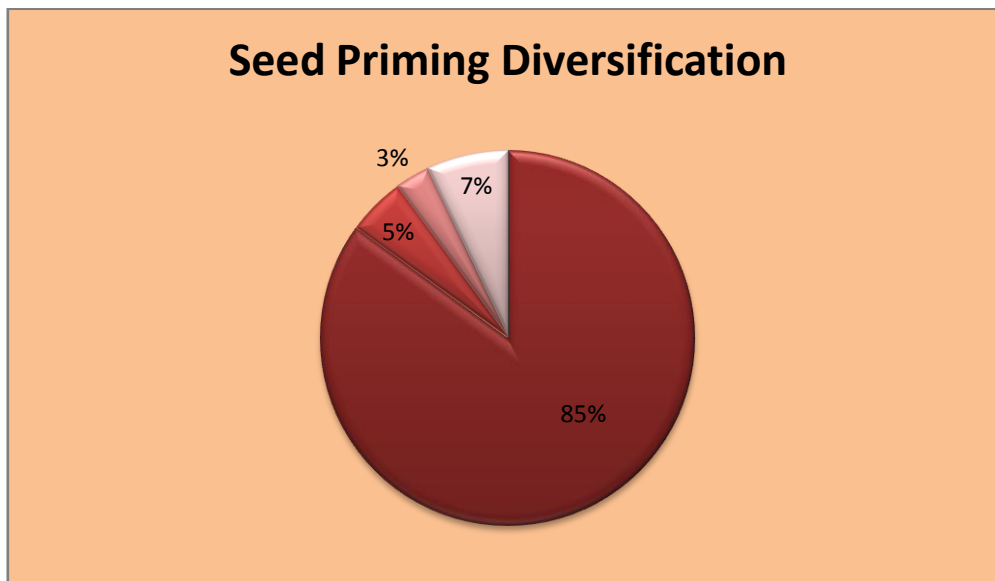


Fig 2: Chemical priming (85%), Bio priming (5%), Physical Priming (3%) and others (7%)

Bio priming percentage is very less (5%) among all types of seed priming method. Chemical priming occupying 85% which is more as well as harmful for seed material, farmers and humanity. Its prime important to reduce chemical priming, so that negative effect of chemical (disease like cancer, lungs disease) priming can minimize. And Physical priming is mostly laboratory oriented (3%). So long gap will create between all types of priming which can occupy by bio seed priming.

Bio Priming Microorganisms

Various types of microorganisms are applied in bio-priming for seed treatment. Some of the microbial entity are as follows,

1. Plant growth promoting rhizo bacteria / PGPR (Mahmood *et al.* 2016), *Azospirillum lipoferum* (Rozier *et al.* 2019).
2. Biophos
3. Trichoderma strains.
4. Purple non-sulfur photosynthetic bacteria (Hayashi *et al.* 2022)
5. Drought alleviating bacteria.
6. Beneficial bacteria (Ex-*Pseudomonas fluorescens*, Raj *et al.* 2004)

Method of Seed Treatment with Microbial Consortia: An Example of Making Consortia for Bio Priming

For the treatment with Biophos, Drought Alleviating Bacteria (DAB) & cold adaptive Plant Growth Promoting Bacteria (PGPB), the following method was used:

- The 50 ml of formulation was diluted in 500 ml water. Addition of sucrose @ 10% was done. This quantity was sufficient to treat seeds required for 1/2 acre.
- The bacterial suspension was sprinkled on the seeds and the seeds were slowly but thoroughly mixed to have a uniform coating. The seeds were left as such for 30 minutes.
- Then the seeds were spread uniformly for drying on a gunny bag in shade for 30-45 minutes avoiding direct sunlight.

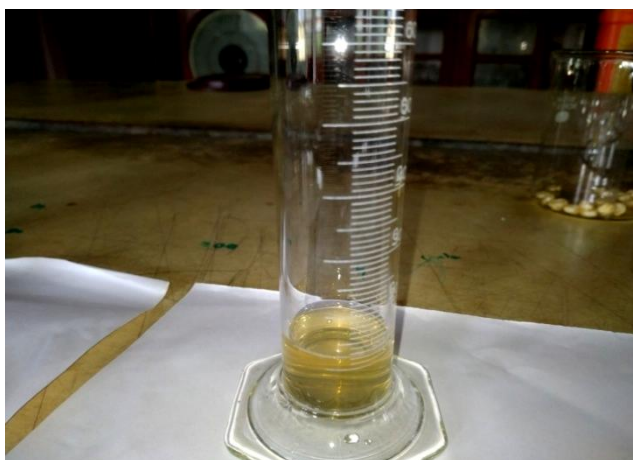


Fig 3: Biophos + DAB + PGPB



Fig 4: Bio Primed Maize Seed



Fig 5: Germinated Bio- primed Maize Seed (Crystal Sand

Like bio-primed maize seed (**Fig 4**), other seed also germinate after treatment with bio priming materials e.g.- Sunflower (**Fig 6**), Cowpea, Ground nut, Bengal gram, Horse gram etc. Kidney bean or Rajmah like crop is fail to germinate in the normal weather but bio-primed seed is successful in germination.



Fig 6: Germinated Bio- primed Sunflower Seed (Crystal Sand Media)

Advantages of Bio Seed Priming:

- Minimizes seed borne pathogen (biotic stress), improving seed health and reducing abiotic stress too.

- Increases speed and uniformity of germination; also ensures rapid, uniform and high establishment of crops; and hence improves harvest quality and yield.

Conclusion

Biopriming becoming popular day by day in the climate change era. Biopriming enhancing supporting organic farming. Farmers, ecosystem and humanity become sustainable day by day. For giving more importance to bio seed priming require more shout out to rank and file by government, non- government organizations through several schemes like MOVCD, other campaigns etc. Then we can convert whole chemical seed priming into bio priming generation.

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