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# Influence of seed bio priming for enhancing seed quality in finger millet (*Eleusine coracana* L. Garten.)

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**Abstract**
Seed bio priming with *Trichoderma harzianum* @ 1 % along with HR-13 recorded higher seed quality parameters *viz*., germination (87.33 %), seedling dry weight (37.26 mg), seedling length (12.40 cm), seedling vigour index I (1088.20) and seedling vigour index II (3254.63). compared to other treatment in the experiment.

**Keywords:** Bio piming, vigour, quality

## Introduction
Finger millet (*Elusine coracana* L. Garten.) commonly called as ragi in India. It is native to Ehiopian highlands. Finger millet is an important staple food in the Eastern and Central Africa as well as some parts of India. It ranks third in importance among millets in the country. It has dual importance as a source of food grain as well as straw and is grown in an area of 1016 ('000 ha) with an annual production of 1385 ('000 t) and with productivity of 1363 kg $ha^{-1}$ (Anon., 2017) [1]. Being as hardy crop finger millet is relatively easy to grow under stressful regimes, without hampering the average productivity. Finger millet is considered to be an ideal food for diabetic individuals due to its low sugar content and slow release of glucose or sugar in the body.

Seed quality means the seed has maximum genetic purity, physical purity, optimum moisture content, free of insect pests and is in good physical condition according to the standard set for seed certification. Finger millet is grown in different agro-ecological conditions hence seed germination and vigour are also influenced by various unfavourable environmental factors such as extreme temperature, drought, untimely planting and so on. Priming technique is the need of present time to get the enhanced germination and establishment in order to utilize the soil moisture and solar radiation to a maximum extent. In this way plants would be able to complete their growth before the stresses arrive (Singh and Singh, 2008) [11]. It involves controlled imbibition of seeds to start the initial events of germination followed by seed drying up to its original weight. Soaking seed in water overnight before sowing can increase the rate of germination and emergence even in soil conditions where moisture content is very low (Clarke *et al*., 2001) [2].

Bio-priming on biocontrol aspects as application of beneficial bacterial inoculum to the seeds and their hydration protect seeds against seed borne diseases. Seed biopriming is being focused as it ensures the entrance of endophytic bacteria into the sides along with avoiding the effect of high temperature (Reddy, 2013) [8]. Bio-priming treatment is potentially able to promote quick and even germination as well as better plant growth (Moeinzadeh *et al*., 2010) [6]. Thus it is necessitated to improve quality of external inputs by utilizing the best combination of useful microorganisms by priming seed for enhancing the germination, vigour and seed yield and its quality

## Materials and Methods
The laboratory experiment were conducted at Department of Seed Science and Technology, College of Agriculture, Raichur during *Kharif* 2019-20. The present study aimed to study the effects of seed bio priming in finger millet varieties to improve quality of seeds. Seeds were soaked for twelve hours with bio priming agents such as *Azospirillum brasilense*, *Pseudomonas fluorescens*, *Phosphobacteria*, *Trichoderma harzianum*, beejamrutha, vermiwash, cow urine and waste decomposer.

**Treatment details**

**Factor-I: Treatments (T)**

$T_o$ - Hydro priming
$T_1$ - *Azospirillum brasilense* @ 20 %
$T_2$ - *Phosphobacteria* @ 20 %
$T_3$ - *Pseudomonas fluorescens* @ 20 %
$T_4$ - *Trichoderma harzianum* @ 1 %
$T_5$ - Beejamrutha @ 50 %
$T_6$ – Cow urine @ 25 %
$T_7$ - Vermiwash @ 2 %
$T_8$ - Waste decomposer @ 20 %

**Factor-II Varieties (V)**

$V_1$ - HR-13
$V_2$ - GPU-67

**Results and Discussion**

In the current investigation, Results revealed (Table 1and 2) that finger millet seeds bio primed with *Trichoderma harzianum* @ 1 % recorded significantly superior in terms of germination per cent (86.99 %), seedling length (12.30 cm), seedling dry weight (36.83 mg), test weight (6.23 g) seedling vigour index I and II (1072.76 and 3204.56), While, lower was recorded in waste decomposer @ 20 % (76.16 %, 10.29 cm, 6.30 mg, 4.99 g, 781.88 and 1241.91 respectively). All the seed quality parameters differed significantly between the varieties. The variety HR-13 recorded significantly higher germination (81.66 %), seedling length (11.38 cm), seedling dry weight (24.20 mg), test weight (5.45 g) seedling vigour index I and II (931.88 and 1990.16). While, lower was recorded in variety GPU-67 (80.61 %, 11.26 cm, 22.60 mg, 5.33 g, 911.07 and 1857.83 respectively). Among the interactions between varieties and different seed bio priming treatments differed significantly for seed quality parameters. Seeds bio primed with *Trichoderma harzianum* @ 1 % in variety HR-13 recorded higher seed germination (87.33 %), seedling length (12.40 cm), seedling dry weight (37.26 mg), test weight (6.30 g), seedling vigour index I and II (1088.20 and 3254.63). While, lower germination per cent (73.66 %), seedling dry weight (16.13 mg) test weight (4.90 g), seedling vigour index I and II (759.01 and 1188.46) recorded in treatment waste decomposer @ 20 % in variety GPU-67. Whereas, seedling length (10.29 cm) was recorded lower in treatment waste decomposer @ 20 % in variety HR-13.

Higher germination in finger millet seeds bio primed with *Trichoderma* might be due to quick extensive network of hypae from *Trichoderma* can help in nourishment of seeds through nutrient uptake and moisture conservation near seeds (Mukhtar *et al*., 2012 in soyabean) [7]. The higher seedling length in seeds primed with *Trichoderma* might be attributed to enlarged embryos, higher rate of metabolic activities and respiration, better utilization and mobilization of metabolites to growing points and higher activity of enzymes. The results corroborates with the findings of Shahazad (2003) [10] in wheat. Tiwari *et al*. (2003) [12] in pearl millet. Saxena *et al.* (2015) [9] in chickpea indicated the enhancement in dry weight of plants with significant increase in the number of leaf in the plants will enhance the vigour when seeds treated with the *Trichoderma*.

**Table 1:** Influence of seed bio priming on germination (%), seedling length (cm) and seedling dry weight (mg) in finger millet varieties *cv*. GPU-67 and HR-13

| Treatments | Germination (%) | | | Seedling length | | | Seedling dry weight | | |
|---|---|---|---|---|---|---|---|---|---|
| | GPU-67 | HR-13 | MEAN | GPU-67 | HR-13 | MEAN | GPU-67 | HR-13 | MEAN |
| $T_o$-Hydro priming | 82.66 | 81.33 | 81.99 | 11.07 | 11.24 | 11.15 | 20.40 | 22.40 | 21.40 |
| $T_1$-*Azospirillum brasilense* @ 20% | 83.66 | 81.33 | 82.49 | 11.34 | 11.76 | 11.55 | 22.40 | 24.33 | 23.36 |
| $T_2$-*Phosphobacteria* @ 20% | 84.33 | 81.66 | 82.99 | 11.33 | 12.00 | 11.66 | 24.53 | 30.33 | 27.43 |
| $T_3$-*Pseudomonas fluorescens* @ 20% | 84.66 | 82.33 | 83.49 | 11.93 | 12.23 | 12.08 | 33.96 | 35.80 | 34.88 |
| $T_4$-*Trichoderma harzianum*@ 1% | 86.66 | 87.33 | 86.99 | 12.20 | 12.40 | 12.30 | 36.40 | 37.26 | 36.83 |
| $T_5$-Beejamrutha @ 50% | 78.00 | 81.33 | 79.66 | 11.26 | 10.90 | 11.08 | 17.05 | 17.26 | 14.31 |
| $T_6$-Cow urine @ 25% | 77.66 | 80.66 | 79.16 | 11.16 | 10.86 | 11.01 | 16.86 | 17.06 | 16.96 |
| $T_7$-Vermiwash @ 2% | 75.00 | 80.33 | 77.66 | 10.76 | 10.77 | 10.76 | 16.40 | 16.86 | 16.63 |
| $T_8$-Waste decomposer @ 20% | 73.66 | 78.66 | 76.16 | 10.30 | 10.29 | 10.29 | 16.13 | 16.46 | 16.30 |
| MEAN | 80.61 | 81.66 | | 11.26 | 11.38 | | 22.05 | 24.20 | |
| | S.Em± | CD @ 1% | | S.Em± | CD @ 1% | | S.Em± | CD @ 1% | |
| V | 0.224 | 0.862 | | 0.011 | 0.034 | | 0.469 | 1.350 | |
| T | 0.242 | 0.931 | | 0.03 | 0.073 | | 1.001 | 2.864 | |
| V x T | 0.342 | 1.317 | | 0.035 | 0.103 | | 1.409 | 4.051 | |

**Table 2:** Influence of seed bio priming on test weight (g), seedling vigour index I and seedling vigour index II in finger millet varieties *cv*. GPU-67 and HR-13

| Treatments | Test weight | | | Seedling vigour index I | | | Seedling vigour index II | | |
|---|---|---|---|---|---|---|---|---|---|
| | GPU-67 | HR-13 | MEAN | GPU-67 | HR-13 | MEAN | GPU-67 | HR-13 | MEAN |
| $T_o$-Hydro priming | 5.21 | 5.36 | 5.29 | 915.37 | 916.63 | 916.00 | 1686.46 | 1821.86 | 1754.16 |
| $T_1$-*Azospirillum brasilense* @ 20% | 5.06 | 5.43 | 5.24 | 948.74 | 948.63 | 948.68 | 1874.10 | 1979.06 | 1926.58 |
| $T_2$-*Phosphobacteria* @ 20% | 5.14 | 5.66 | 5.40 | 955.76 | 978.00 | 966.88 | 2068.96 | 2477.00 | 2272.98 |
| $T_3$-*Pseudomonas fluorescens* @ 20% | 5.52 | 5.90 | 5.71 | 1010.33 | 1005.02 | 1007.67 | 2876.86 | 2947.56 | 2912.21 |
| $T_4$-*Trichoderma harzianum*@ 1% | 6.16 | 6.30 | 6.23 | 1057.33 | 1088.20 | 1072.76 | 3154.50 | 3254.63 | 3204.56 |
| $T_5$-Beejamrutha @ 50% | 5.17 | 5.23 | 5.20 | 878.28 | 890.85 | 884.56 | 1331.20 | 1404.36 | 1367.78 |
| $T_6$-Cow urine @ 25% | 5.19 | 5.14 | 5.16 | 867.30 | 881.96 | 874.63 | 1309.96 | 1376.7 | 1343.33 |
| $T_7$-Vermiwash @ 2% | 5.63 | 5.13 | 5.38 | 807.50 | 872.93 | 840.21 | 1230.00 | 1354.96 | 1292.48 |
| $T_8$-Waste decomposer @ 20% | 4.90 | 5.08 | 4.99 | 759.01 | 804.74 | 781.88 | 1188.46 | 1295.36 | 1241.91 |
| MEAN | 5.33 | 5.45 | | 911.07 | 931.88 | | 1857.83 | 1990.16 | |
| | S.Em± | CD @ 5% | | S.Em± | CD @ 1% | | S.Em± | CD @ 1% | |
| V | 0.0271 | 0.065 | | 3.143 | 12.088 | | 23.817 | 91.600 | |
| T | 0.051 | 0.132 | | 3.395 | 13.057 | | 25.725 | 98.940 | |
| V x T | 0.068 | 0.195 | | 4.801 | 18.466 | | 36.381 | 139.922 | |

Increased in test weight and vigour in *Trichoderma* treatment in our study may be due to the ability of *Trichoderma* isolates to survive and colonize in the root and rhizosphere affects the seed yield and quality of seed lot. The response of bio priming on test weight and vigour has been reported by (Mishra *et al*., 2014) [5].

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