Effect of EF polymer in seed germination of ridge gourd

Abstract

The present study reports that EF polymer in rooting media bestows myriads effect on germination of seedlings in ridge gourd plants. Herein, seed treatment with media of cocopeat, perlite, vermiculite (3:1:1) and 1 gm of EF polymer improved seedling germination, root and shoot growth. Initial germination at (3.25 days), 50% germination (7.5 days), shoot length (8.4cm), root length (10.6 cm), seedling height (19.675 cm), chlorophyll content (2.2075 mg/100), number of leaves per plant (6), number of roots per plant (15.25), minimum seedling mortality (3.75), stem girth (1.70 mm) and net profit in per pot tray (2500 Rs) as compare to control. The obtained results claim that 1 gm EF polymer along with cocopeat, perlite and vermiculite act as bio stimulant to nitrogen. It contains micronutrient which is transport during germination therefore, enhance seedling growth.

Key words: EF polymer, seed germination, rooting media, ridge gourd

1. INTRODUCTION:

Germination is a critical stage in life cycle of crop plants it influences crop yield. For germination seed require good growing media or substrate that provide adequate support, nutrients and gaseous exchange within the roots through water. (**1**). Moreover, seed germination is affected by many factors such as oxygen, temperature, water and light. During winter germination of cucurbits is not due to low temperature germination of cucurbits is not possible. Generally, media used for vegetable nursery is cocopit, perlite and vermiculite in ratio (3:1:1). However, to enhance germination EF polymer as media act as good biostimulant as it is superabsorbent and favour seed germination, root development, plant growth by contributing aeration, drainage and minimize nutrient losses. The results of many experiments reveled that EF polymer used alone and along with media is suitable for lettuce seeds (**3**), coffee seedling (**4**). The quality of seedling obtained from nursery influences re-establishment in the field and eventually affect the productivity of vegetable.

Ridge gourd (*Luffa acutangula*) having (2n= 26). It is originated from Asia. It is monoecious plant and a fruit contains protein (0.5%), carbohydrates (3.4%), carotene (37 mg), vitamin C 18mg/100 per 100g edible fresh weight. It contains a gelatinous compound

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called luffing. In India, area under ridge gourd cultivation 24800 acre and production 39 toon per acre (s).

Keeping in view, the aim of this experiment to study the effect of eco-friendly polymer on seed germination, seedling growth and vigour of ridge gourd seedlings.

2. MATERIAL AND METHODS

2.1 Seed material and treatment

Ridge gourd seed var. Arka Prasan was purchased from IIHR, Bangalore. Rooting media cocopeat, vermiculite and perlite was purchased from local market of Udaipur. However, EF polymer (Fasal amrit) was purchased from E F polymer Private Limited, Rajsamand, Rajasthan. An experiment on seed germination and seedling growth of Ridge gourd var. Arka Prasan was carried out at Instructional Farm, Rajasthan College of Agriculture, Udaipur, Department of horticulture, MPUAT Udaipur during January 2022. Experimental treatments comprised of seven treatment combinations i.e. EF polymer- S_0 (Control), S_1 (0.5gm EF polymer + 3:1:1 ratio cocopeat, perlite and vermiculite), S_2 (1gm EF polymer + 3:1:1 ratio cocopeat, perlite and vermiculite), S_3 (1.5 gm EF polymer + 3:1:1 ratio cocopeat, perlite and vermiculite), S_4 (2 gm EF polymer + 3:1:1 ratio cocopeat, perlite and vermiculite), S_5 (2.5gm EF polymer + 3:1:1 ratio cocopeat, perlite and vermiculite), S_6 (3gm hydrogel+3:1:1 ratio cocopeat, perlite and vermiculite) having four replicate. The seed sowing was done in month of January about 1 cm deep in different concentration of media in portrays. They were irrigated at seven days interval.

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2.2 Experimental design

The experiment was laid out in CRD and four replicate. Each treatment composed of 40 celled portrays. All observations on germination parameters were recorded at the time of germination, and growth parameters from 10 randomly selected seedlings at the time of transplanting (45 days after seed sowing). Observations on germination were recorded at

2.3 First and 50 percent germination was estimated visually from day after sowing.

2.4 Shoot length and root length was measured in centimeter with the help of scale at the time of transplanting.

2.5 Total chlorophyll content was determined in leaves of ridge gourd from ten randomly selected plants of each treatment from each replication was recorded with method suggested by Sadasivam and Manickam, (1997) at the time of transplanting.

2.6 Seedling height was measured in centimeter with the help of scale at the time of transplanting.

2.7 Number of leaves per plant: Five plants are selected randomly from each replication and number of leaves are counted from the selected plants.

2.8 Number of roots per plant: five plants are selected randomly from each replication and number of roots are counted from the selected plants.

2.9 Stem girth (mm): girth measure with the help of Vernier caliper, select five plants randomly from each replication and reading from Vernier caliper was recorded.

2.10 Survival and Mortality: It was calculated by counting total number of seedlings survived and died from total number of seed sown in portrays.

2.11 Net profit (Rs): gross return was calculated by multiplying the no of seedling with their selling price in the market. Later, by deducting the cost of cultivation from the gross return, net return was calculated.

3. RESULT AND DISCUSSION

3.1 Seed germination parameters

Highest seed germination (11.5) in ridge gourd was recorded with 1gm EF polymer + 3:1:1 ratio cocopit, perlite and vermiculite) followed by 50% germination in (1.5 gm EF polymer + 3:1:1 ratio cocopit, perlite and vermiculite) as compared to control. According to (**6**) hydrogel had significant effect on *Fagus sylvatica* seedlings compared to the controls because EF biopolymer is encapsulated with micronutrient which when mixed in media improved the physical property and good water holding capacity. An adequate moisture supply ensures successful germination.

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Table 1. Effect of EF polymer in seed germination parameters of ridge gourd

Treatment	First germination (days)	50% germination (days)	Shoot length (cm)	Root length (cm)	Seedling height (cm)	Number of leaves per plant
S0	11.5±0.96^{A}	20.25±0.63^{A}	4.55±0.27^{E}	8.22±0.54^{C}	10.27±0.38^{D}	4.0±0.41^{A}
S1	5.25±0.62^{BC}	15.25±0.29^{B}	6.77±0.17^{C}	9.67±0.45^{ABC}	16.45±0.18^{B}	4.75±0.63^{A}
S2	3.25±0.75^{C}	13.25±0.64^{BC}	8.4±0.15^{A}	10.6±0.35^{A}	19.67±0.15^{A}	6.0±0.41^{A}
S3	4.75±1.11^{BC}	10.5±1.04^{CD}	8.0±0.19^{AB}	10.05±0.12^{AB}	17.25±0.36^{B}	4.75±0.48^{A}
S4	5±0.41^{BC}	10.25±1.31^{CD}	7.3±0.17^{BC}	9.85±0.31^{ABC}	16.55±0.44^{B}	4.75±0.48^{A}
S5	6.75±0.48^{B}	9.5±0.85^{CD}	6.57±0.28^{CD}	8.825±0.22^{BC}	13.30±1.06^{C}	4.25±0.48^{A}
S6	8±0.58^{B}	7.5±0.85^{D}	5.75±0.17^{D}	8.90±0.35^{BC}	12.0±0.24^{CD}	4.25±0.48^{A}

3.2 Seedling growth parameters

It is clearly seen that growing media 1gm EF polymer + 3:1:1 ratio cocopeat, perlite and vermiculite (S2) showed significant ($P<0.05$) influence on seedling growth parameters in ridge gourd as compared to control (Table 1). This result showed that EF polymer enhances cation exchange capacity and better absorption of nutrients. Researchers Molghadam reported similar results in canola while (**7**) reported that polymer in media increase water holding capacity reported that EF polymer in media has suitable physical property. Moreover, good water holding capacity and provide essential nutrient required for initial growth. Similarly, Highest shoot length (8.4cm) and root length (10.6cm) found in the (1gm EF polymer + 3:1:1 ratio cocopeat, perlite and vermiculite) S2 treatment followed by (1.5 gm EF polymer + 3:1:1 ratio cocopeat, perlite and vermiculite) S3 compared to the S0 (control). Reported that organic super absorbent showed significant effect on root length because the EF polymer has good pore space maintain and good physical property of media. Further, 1gm EF polymer + 3:1:1 ratio cocopeat, perlite and vermiculite had significant effect on seedling height. The maximum seedling height (19.67 cm), number of leaves per seedling, number of leaves (6) found in S2 (1.5 gm EF polymer + 3:1:1 ratio cocopeat, perlite and vermiculite) compare to as control.

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Table 2. Effect of EF polymer in seed growth parameters of ridge gourd

Treatment	Chlorophyll content (mg/100g)	Stem girth (mm)	Number of roots per plant	Seedling mortality	Healthy seedling	Net profit (Rs)
S0	1.39±0.07^{D}	1.02±0.06^{C}	8.5±0.64^{C}	8.0±0.41^{A}	14.5±0.64^{D}	1705±77.62^{D}
S1	1.89±0.047^{BC}	1.41±0.14^{ABC}	11.5±1.19^{BC}	5.5±0.64^{AB}	19.5±0.87^{ABC}	2267±34.97^{B}
S2	2.21±0.05^{A}	1.70±0.09^{A}	15.25±0.85^{A}	3.75±0.85^{B}	22.5±0.64^{A}	2535±62.38^{A}
S3	2.04±0.06^{AB}	1.46±0.05^{AB}	12.75±0.48^{AB}	4.5±0.64^{B}	21.0±0.91^{AB}	2340±29.15^{AB}
S4	1.92±0.02^{B}	1.46±0.02^{AB}	12.25±0.85^{AB}	5.0±0.41^{B}	20.5±0.64^{BC}	2327±34.97^{AB}
S5	1.80±0.09^{BC}	1.34±0.11^{ABC}	10.25±0.75^{BC}	6.0±0.58^{AB}	18.5±0.64^{BC}	2155±26.29^{BC}
S6	1.62±0.04^{CD}	1.26±0.11^{BC}	9.5±0.64^{BC}	6.5±0.64^{AB}	17.0±0.41^{CD}	2010±32.40^{C}

Moreover, 1gm EF polymer + 3:1:1 ratio cocopeat, perlite and vermiculite had significant effect on chlorophyll content (0.05mg/100g), whereas minimum (0.07mg/100) found in control (S0). Similarly, highest stem girth (1.7025mm), roots per plant (15.25) was reported in 1gm EF polymer + 3:1:1 ratio cocopeat, perlite and vermiculite as compared to control (1.01cm) stem girth, roots per plant (8.5). Morover, minimum mortality (3.75), highest healthy seedling (22.5), and highest net profit (2535 Rs) was noticed in 1gm EF polymer + 3:1:1 ratio cocopeat, perlite and vermiculite (S2). to According to (**8**) hydrogel had significant effect on coffee shoot length, higher root length, stem girth, plant height and no of leaves per plant, because hydrogel has proper aeration, improve water holding capacity.

4. CONCLUSION

The results of the present study indicated that application of EF biopolymer had significant effect on seedling emergence and growth parameters of seedling such as root and shoot length, stem girth, number of leaves per plant, number of roots per plant, seedling height, seedling mortality, healthy seedling parameters of ridge gourd. In particular, 1gm EF polymer + 3:1:1 ratio cocopeat, perlite and vermiculite exhibited potential increase in moisture conservation and enhance seedling growth of crop. It overcome stress condition.

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