Effect of ball culture in seed germination of ridge gourd

Abstract

Growing media is the important aspect to measure healthy seedlings in ridgegourd. Hydrogel polymer in media provide bio-stimulant to nitrogenpromotes seed germination through function as signaling molecule. The present study reports that hydrogel polymer when mixed with cocopeat, perlite, vermiculite (3:1:1) ratio bestows myriad effects on seedling growth.Herein, seed sown inmedia of cocopeat, perlite, vermiculite (3:1:1) along with 1 gm hydrogel polymer improved seedling germination, root and shoot growth, chlorophyll content and net profit as compared to control.

Key words: Hydrogel 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 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 ball culture on seed germination, growth and vigour of ridge gourd seedling.

2. MATERIAL AND METHODS

2.1 Seed material and treatment

Ridge gourd seed var. ArkaPrasan was purchased from IIHR, Bangalore. Rooting media cocopeat, vermiculite and perlite was purchased from local market of Udaipur. However, EF polymer (Fasalamrit) was purchased from E F polymer Private Limited, Rajsamand, Rajasthan. An experiment on seed germination and seedling growth of Ridge gourd var. ArkaPrasan was carried out at Instructional Farm, Rajasthan College of Agriculture, Udaipur, Department of Horticulture, MPUAT Udaipur (24.58 latitudes, 73.70 longitudes) from January 2022 to February 2022. Experimental treatments comprised of seven treatment combinations i.e. hydogel polymer- S_0 (Control), S_1 (0.5gm hydogel polymer + 3:1:1 ratio cocopeat, perlite and vermiculite), S_2 (1gm hydogel + 3:1:1 ratio cocopeat, perlite and vermiculite), S_3 (1.5 gm hydogel + 3:1:1 ratio cocopeat, perlite and vermiculite), S_4 (2 gm hydogel + 3:1:1 ratio cocopeat, perlite and vermiculite), S_5 (2.5gm hydogel + 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.

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 (30 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 30 days 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 30 days of transplanting.

2.6 Seedling height was measured in centimeter with the help of scale after 30 days of transplanting.

2.7 Number of leaves per plant: were recorded fromfive randomly selected seedlings at 30 days of transplanting.

2.8 Total number of roots per plant:were recorded by counting total number of roots fromfive randomly selected seedlings at 30 days of transplanting.

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 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.

2.11 Statistical analyses

Experiment was carried out in four-time replicate. Each replicate having 40 celled portrays for each treatment and ten seedlings were selected for sample. Statistical analysis was performed with JMP software version 12 Turkey Kramer HSD at (p=0.05).

3. RESULT AND DISCUSSION

3.1 Seed germination parameters

Seed germination was evaluated just after sowing of seed. It was recorded that 1gm hydrogel + 3:1:1 ratio cocopit, perlite and vermiculitein ball culture significantly initiate the firstgermination (3.25 days) while 50% germination (7.5 days) as compared to control and higher concentration of hydrogel used in media. According to (**6**) hydrogel had significant effect on *Fagus sylvatica* seedlings compared to the controls because hydogel biopolymer is encapsulated with micronutrient which when mixed in media improved the physical property and good water holding capacity. An adequate moisture supply to ensures successful germination.

Table 1. Effect of ball culture 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
Control (0 g L^{-1})	11.5 ± 0.96^{A}	20.25 ± 0.62^{A}	4.55 ± 0.27^{E}	8.22 ± 0.54^{C}	10.27 ± 0.38^{D}	4.0 ± 0.41^{A}
0.5 g L^{-1} hydrogel	5.25 ± 0.62^{BC}	10.5 ± 0.29^{CD}	6.77 ± 0.17^{C}	9.67 ± 0.45^{ABC}	16.45 ± 0.18^{B}	4.75 ± 0.63^{A}
1 g L^{-1} hydrogel	3.25 ± 0.75^{C}	7.5 ± 0.64^{D}	8.4 ± 0.15^{A}	10.6 ± 0.35^{A}	19.67 ± 0.15^{A}	6.0 ± 0.41^{A}

1.5g L^{-1} hydrogel	4.75±1.11^{BC}	9.5±1.04^{CD}	8.0±0.19^{AB}	10.05±0.12^{AB}	17.25±0.36^{B}	4.75±0.48^{A}
2 g L^{-1} hydrogel	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}
2.5 g L^{-1} hydrogel	6.75±0.48^{B}	13.25±0.85^{BC}	6.57±0.28^{CD}	8.825±0.22^{BC}	13.30±1.06^{C}	4.25±0.48^{A}
3 g L^{-1} hydrogel	8±0.58^{B}	15.25±0.85^{B}	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

Seedling growth parameters were estimated after 30 days of transplanting. It is clearly seen that ball culture having1gm hydrogelin3:1:1 ratio cocopeat, perlite and vermiculite (S2) showed significant ($P<0.05$) influence on shoot length (8.4 cm), root length (10.60 cm), seedling height(19.67cm), chlorophyll content (2.21 mg/100 gm), stem girth (1.70 cm) and total number of plants (15.25) in ridge gourd as compared to control (Table 1 and 2). A non – significant was noticed in number of leaves among all the treatments. This result showed that hydrogel polymer has more cation exchange capacity. It is good absorbent of macromolecule present in media (**9**). Increase in water holding capacity due to hydrogel significantly reduced the irrigation requirement of many plants (**11**) Researchers (**7**) reported that hydrogel in media enhance physio-chemical property of media.According to (**8, 10**) 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.

Table 2.Effect of ball cultureon chlorophyll content, stem girth, root length and net return of ridge gourd

Treatment	Chlorophyll content (mg/100g)	Stem girth (cm)	Total number of roots per plant	Net profit (Rs)
Control (0 g L^{-1})	1.75±0.02^{BC}	1.02±0.06^{C}	8.5±0.64^{C}	1705±77.62^{D}
0.5 g L^{-1} hydrogel	1.89±0.05^{B}	1.41±0.14^{ABC}	11.5±1.19^{BC}	2267±34.97^{B}
1 g L^{-1} hydrogel	2.21±0.05^{A}	1.70±0.09^{A}	15.25±0.85^{A}	2535±62.38^{A}
1.5g L^{-1} hydrogel	2.04±0.05^{B}	1.46±0.05^{AB}	12.75±0.48^{AB}	2340±29.15^{AB}
2 g L^{-1} hydrogel	1.92±0.02^{B}	1.46±0.02^{AB}	12.25±0.85^{AB}	2327±34.97^{AB}
2.5 g L^{-1} hydrogel	1.80±0.09^{BC}	1.34±0.11^{ABC}	10.25±0.75^{BC}	2155±26.29^{BC}
3 g L^{-1} hydrogel	1.62±0.04^{C}	1.26±0.11^{BC}	9.5±0.64^{BC}	2010±32.40^{C}

4. Economic feasibility

Net return was estimated after sale of ridge gourd seedling and it was observed that ball culture having 1 g L^{-1}hydrogelobtained 35% increase in net return as compared to control (Table 2).

5. CONCLUSION

The results of the present study indicated thatapplication of1gm hydrogel polymer + 3:1:1 ratio cocopeat, perlite and vermiculite in ball culturesignificantly 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, chlorophyll content of ridge gourd seedling. Moreover, use hydrogel in ball culture exhibited potential increase in moisture conservation and enhance seedling growth of crop. Therefore, from sale more net return was obtained.

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