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Conceptual efficacy study on effect of seed treatment with organic liquid formulations on germination and seedling vigour in oriental pickling melon in Trissur, Kerala

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Abstract

An experiment was conducted on effect of various seed treatment with liquid formulations on germination and seedling vigour in oriental pickling melon during Rabi, 2013 at Agricultural Technology Information Centre, University of Agricultural Sciences, College of Horticulture, and Vellanikkara at Thrissur district in Kerala. Results revealed that, the Treatment T₃ Panchagavyam was recorded early germination and the highest germination percentage (70%) while lowest and late germination recorded in treatment T₈ (Control). Among the organic liquid formulations, Treatment (T₆) Panchagavyam+ *Pseudomonas* was recorded highest Root and shoot length of seedlings (2.76 cm and 13.63cm), Fresh weight and dry weight of plants (300 mg and 34.66 mg), Vigour index (1581.33) but lowest recorded in control Treatment T₈ during experimentation on Oriental pickling melon.

Keywords: Oriental pickling melon, panchagavyam + *Pseudomonas*, germination, vigour index fresh weight and dry weight, seed treatment, organic and liquid formulations

1. Introduction

Organic farming is estimated to be growing at 30% a year worldwide in response to market forces. The demand for certified organic produce, especially vegetables, currently exceeds supply and, in many cases, produce attracts premium prices (Ashley *et al.* 2007)^[1]. During the past two or three decades the situation has begun to change. Now a days, important concern about food quality, farm worker health, rural development and the environmental impacts of farming systems. Organic agricultural production is undergoing a rapid transformation as the demand for healthier food and more environmentally sound production increases globally. Large producers are adopting organic practices to meet the growing demand (Smukler *et al.* 2008)^[2].

The current global scenario firmly emphasizes the need to adopt eco-friendly agricultural practices for sustainable food production. The cost of inorganic fertilizers is increasing enormously to an extent that they are out of reach of small and marginal farmers. The Panchagavya, Jeevamruth and Beejamruth were ecofriendly organic preparations made from cow products. The usage of organic liquid products such as Beejamruth, Jeevamruth and Panchagavya results in higher growth, yield and quality of crops. These liquid organic solutions are prepared from cow dung, urine, milk, curd, ghee, legume flour and jiggery. They contain macro nutrients, essential micro nutrients, many vitamins, essential amino acids, growth promoting factors like IAA, GA and beneficial microorganisms (Palekar, 2006; Natarajan, 2007; Sreenivasa *et al.*, 2010)^[6, 9, 7].

In recent times the concept of organic farming system has been receiving increasing attention worldwide obviously for reasons of economization of fertilizer usage, safeguarding and ensuring scientific management of soil health for optimum growth, yield and quality of crops in an integrated manner in a specific agro ecological situations through balanced usage of organic and inorganic plant nutrients, so that one can harvest good yield without deteriorating soil health. Research works on organic farming system and seed treatment formulation for cucumber crop is very scanty. Therefore the present investigation is undertaken to study the effect of various seed treatment with liquid formulations on germination and seedling vigour on cucumber production were taken for safety and efficacy.

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2. Materials and Methods

A research experiment was conducted on effect of various seed treatment with liquid formulations on germination and seedling vigour in oriental pickling melon in the green house of Agricultural Technology Information Centre (ATIC) in Mannuthy, College of Horticulture, Vellanikkara at Thrissur and Kerala during 22nd November to 7th December, 2013. A most commonly cultivated Soubhagya variety was selected because high yielding with quality and quantity characteristics like fruits are small to medium in size, golden yellow color with short duration. Complete randomized design with optimum replications were followed during experimentation. The ANOVA and SPSS statistical tools were used for analysis process.

Treatments

T₁ - Cowdung slurry (1: 2) (1part cow dung: 2 parts water)

T₂ - Cow urine (5%)

T₃ - Panchagavyam (30%)

T₄ - Beejamrutham (100%)

T₅ - *Pseudomonas fluorescens* (KAU culture) (5%)

T₆ - (T₃ + T₅)

T₇ - (T₄ + T₅)

T₈ - Control (Water)

3. Results and Discussion

3.1 Germination percentage and seedling characters as influenced by seed treatment

The present study results were depicted in Table 1 and Figure 1. Among all the treatments, Panchagavyam (T₃) Panchagavyam+ *Pseudomonas* (T₆) recorded early germination and the highest germination percentage (70%) followed by Cow dung slurry (66%) (T₁) and Beejamrutham (T₄) was 53 per cent. Panchagavyam, Cowdung slurry and Beejamrutham contains several hormones which enhanced the germination of seeds, same recordings were observed by Palekar (2007)^[9] and Sreenivasa *et al.* (2011)^[10].

3.2 Seedling characters

A seedling characters includes a Time taken for emergence of radicle and plumule, Length of radicle and plumule, Fresh weight and dry weight of plants and seed vigour index.

Present Study showed that, there is no significant difference could be noticed among the all treatments regarding the time taken for emergence of radicle and plumule (Table 2). All the treatments took 2 days for emergence of radicle and plumule, except for control Treatment which took 3 days.

Length of radicle data reported that, there was significant difference among the treatments regarding the length of radicle at 7 DAS and 15 DAS. The length of radicle (Table 2) recorded at 7 DAS was the highest (2.76cm) in T₁ (Cow dung slurry) and T₆ (Panchagavyam+ *Pseudomonas*). Minimum length was recorded in control plants (1.43cm). On 15th day, T₆ (Panchagavyam) recorded the highest value (7.53 cm) followed by T₁ (Cow dung slurry) and T₂ (Cow urine) being 6.83cm. Minimum length of root (5.27cm) was recorded in control plants (Table 4).

Length of plumule data noticed that the length of plumule recorded at 7DAS was significantly superior in T₆ (Panchagavyam+ *Pseudomonas*) being 13.63cm but on par with T₇ (Beejamrutham+ *Pseudomonas*). The lowest value of 9.7cm was recorded in T₈ (Control) as provided in Table 2.

The length of shoot recorded at 15DAS was the highest in T₆ (Panchagavyam+ *Pseudomonas*) being 19.07 cm followed by 18.50 cm in T₄ (Beejamrutham). The lowest value of 14.33 cm was recorded in T₈ (Control) as shown in Table 4.

Fresh weight results revealed, the whole plant fresh weight recorded at 7 DAS and 15 DAS showed significant difference among the treatments. At 7 DAS, the highest value of 300 mg was obtained in T₆ (Panchagavyam+ *Pseudomonas*) and the lowest of 116.66mg in control (Table 3). The same trend was observed at 15 DAS (Table 4). The highest value was recorded in T₆ (Panchagavyam+ *Pseudomonas*) being 456.66mg but was on par with T₅ and T₇ (450.00 mg). The lowest value (216.66 mg) was observed in control plants.

Dry weights results reported that, the dry weight of the plants at 7 DAS is presented in Table 3. The treatment receiving T₆ (Panchagavyam+ *Pseudomonas*) recorded significantly higher value of 34.66 mg followed by T₅ (*Pseudomonas*) and T₄ (Beejamrutham) being 32.33 mg and 30.66 mg respectively. The control had the lowest value of 9.66 mg. The data of dry weight at 15 DAS (Table 4) revealed that T₆ (Panchagavyam+ *Pseudomonas*) had the highest value of 59.33 mg followed by T₅ (57.33 mg) and T₇ (56.00 mg). The lowest value of 20.33 mg was observed in control plants, same investigation results were received by Chandrakala (2008)^[4] during combined application of liquid manures like Beejamrutham and Panchagavyam significantly enhanced the growth in chilli seedlings.

Vigour index results investigated that, At 7 DAS, the highest vigour index of 1581.33 was recorded in T₆ (Panchagavyam+ *Pseudomonas*) followed by T₇ and the lowest in control (T₈) being 794.66 (Table 3). The value (2567.28) was the highest in T₆ (Panchagavyam+ *Pseudomonas*) but on par with T₁, T₃, T₄ and T₇ at 15 DAS. The control plants recorded the lowest vigour index of 1243.66 (Table 4). The above results were tallied with the reports of Pillai (2012)^[8] in amaranth and okra and Krishnan (2014)^[3] in salad cucumber.

The seeds treated with liquid organic manures showed better results in all observations such as germination percentage, length of radicle, length of plumule, dry weight, fresh weight and vigour index. The treatments receiving Panchagavyam+ *Pseudomonas*, Beejamrutham+ *Pseudomonas*, Panchagavyam and cow dung slurry were superior in early germination and seedling growth. It is very clearly stated that seed treatment with organic liquid formulations have improved the seed germination, its characteristics and seedling vigour due to the growth promoting substances and micro organisms present in the liquid formulations.

Table 1: Germination percentage at 4 and 7 DAS as influenced by the treatments

Treatments	Germination %	
	4 DAS	7 DAS
T ₁ - Cow dung slurry (1: 2)	66.66 ^a	96.66 ^a
T ₂ - Cow urine (5%)	53.30 ^{ab}	90.00 ^a
T ₃ - Panchagavyam (30%)	70.00 ^a	100.00 ^a
T ₄ - Beejamrutham (100%)	53.00 ^{ab}	93.33 ^a
T ₅ - <i>Pseudomonas</i> (5%)	43.33 ^{bc}	93.33 ^a
T ₆ - (T ₃ + T ₅)	35.00 ^c	96.66 ^a
T ₇ - (T ₄ + T ₅)	30.00 ^d	93.33 ^a
T ₈ - Control (water alone)	10.00 ^d	83.33 ^b
CD (0.05)	18.69	10.60

Table 2: Radicle and plumule characters at 7 DAS as influenced by the treatments

Treatments	Time taken for radical emergence (Days)	Time taken for plumule emergence (Days)	Length of radicle (cm)	Length of plumule (cm)
T ₁ - Cow dung slurry (1: 2)	2	2	2.76 ^a	11.33 ^{bc}
T ₂ - Cow urine (5%)	2	3	2.43 ^a	11.20 ^{cd}
T ₃ - Panchagavyam (30%)	2	2	2.43 ^a	10.93 ^{cd}
T ₄ - Beejamrutham (100%)	2	2	2.56 ^a	11.83 ^{bc}
T ₅ - <i>Pseudomonas</i> (5%)	2	2	2.53 ^a	12.86 ^{ab}
T ₆ - T ₃ + T ₅	2	2	2.76 ^a	13.63 ^a
T ₇ - T ₄ + T ₅	2	2	2.26 ^a	13.56 ^a
T ₈ - Control (water alone)	3	4	1.43 ^b	9.70 ^d
CD (0.05)	NS	NS	0.52	1.55

Table 3: Fresh weight, dry weight and vigour index of seedlings at 7 DAS as influenced by the treatments

Treatments	Fresh weight (mg)	Dry weight (mg)	Vigour index - I
T ₁ - Cow dung slurry (1: 2)	250.00 ^{ab}	26.33 ^{bc}	1365 ^a
T ₂ - Cow urine (5%)	216.66 ^b	21.66 ^c	1096 ^b
T ₃ - Panchagavyam (30%)	250.00 ^{ab}	27.00 ^{bc}	1336 ^{ab}
T ₄ - Beejamrutham (100%)	283.33 ^{ab}	30.66 ^{ab}	1345 ^a
T ₅ - <i>Pseudomonas</i> (5%)	273.33 ^{ab}	32.33 ^{ab}	1436 ^a
T ₆ - (T ₃ + T ₅)	300.00 ^a	34.66 ^a	1581 ^a
T ₇ - (T ₄ + T ₅)	250.00 ^{ab}	27.66 ^{abc}	1483 ^a
T ₈ - Control (water alone)	116.66 ^c	9.66 ^d	794 ^c
CD (0.05)	81.03	7.60	247

Table 4: Seedling growth characters at 15 DAS as influenced by the treatments

Treatments	Length of root (cm)	Length of shoot (cm)	Fresh weight (mg)	Dry weight (mg)	Vigour index- I
T ₁ - Cow dung slurry (1: 2)	6.83 ^{ab}	17.00 ^{bcd}	350.00 ^{bc}	42.33 ^{cd}	2303 ^a
T ₂ - Cow urine (5%)	6.83 ^{ab}	15.66 ^{de}	316.66 ^c	34.33 ^d	2025 ^b
T ₃ - Panchagavyam (30%)	6.16 ^{bc}	16.83 ^{cd}	350.00 ^{bc}	44.33 ^{bcd}	2436 ^a
T ₄ - Beejamrutham (100%)	6.67 ^b	18.50 ^a	416.66 ^{ab}	52.66 ^{abc}	2352 ^a
T ₅ - <i>Pseudomonas</i> (5%)	5.53 ^{cd}	18.33 ^{ab}	450.00 ^a	57.33 ^{ab}	2229 ^{ab}
T ₆ - (T ₃ + T ₅)	7.53 ^a	19.07 ^a	456.66 ^a	59.33 ^a	2567 ^a
T ₇ - (T ₄ + T ₅)	5.53 ^{cd}	17.66 ^{abc}	450.00 ^a	56.00 ^{ab}	2290 ^a
T ₈ - Control (water alone)	5.27 ^d	14.33 ^e	216.66 ^d	20.33 ^e	1243 ^c
CD (0.05)	0.79	1.43	97.02	13.39	268

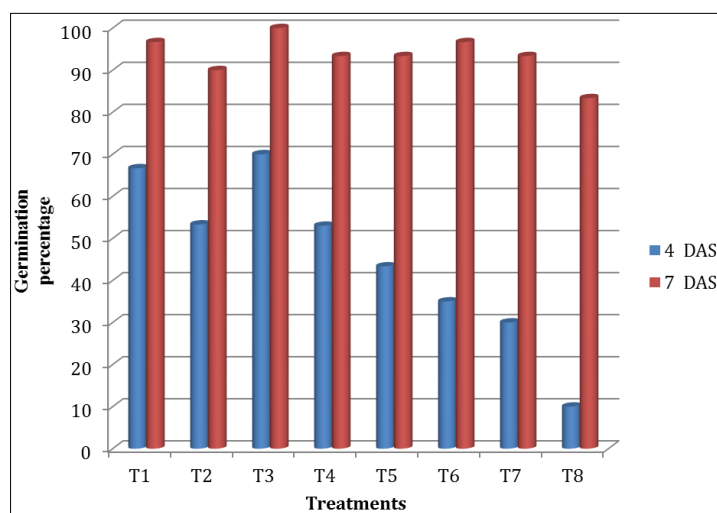


Fig 2: Germination percentage as influenced by the treatments at 4 and 7 DAS

- T1. Cowdung slurry (1: 2)
- T2. Cow urine (5%)
- T3. Panchagavyam (30%)
- T4. Beejamrutham (100%)
- T5. *Pseudomonas* (5%)
- T6. T₃ + T₅
- T7. T₄ + T₅
- T8. Control (1part cow dung: 2 parts water)

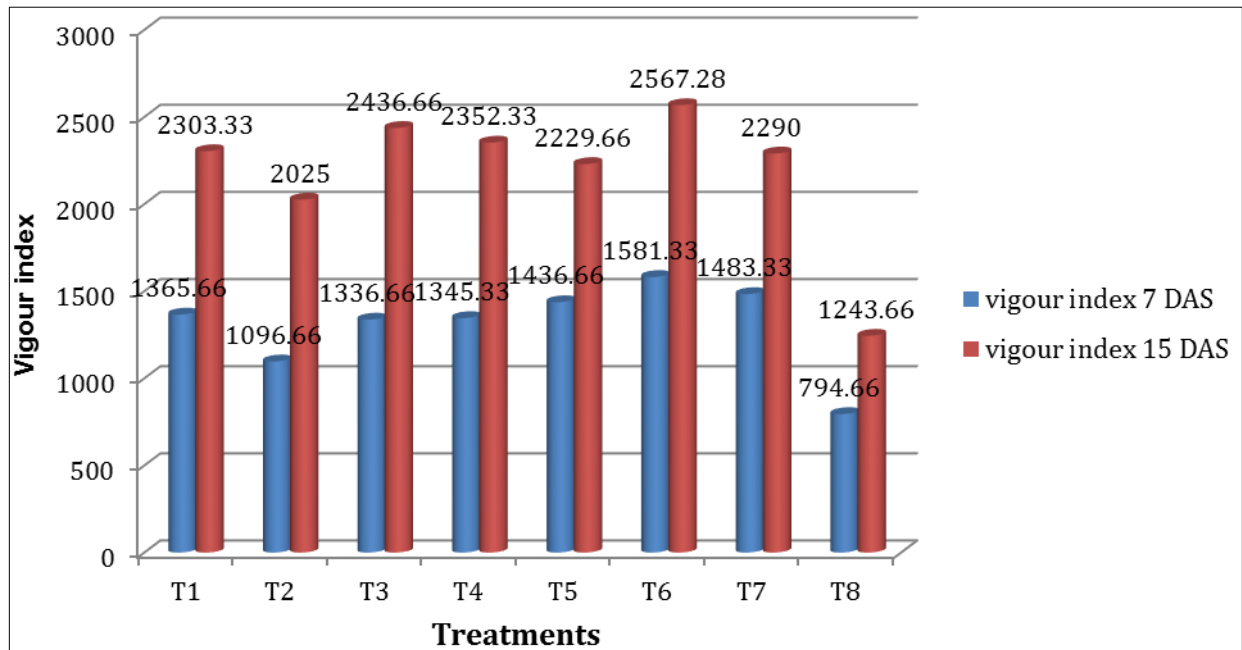


Fig 3: Vigour index of seedlings as influenced by the treatments at 7 and 15 DAS

- T1. Cowdung slurry (1: 2)
 T2. Cow urine (5%)
 T3. Panchagavyam (30%)
 T4. Beejamrutham (100%)
 T5. Pseudomonas (5%)
 T6. T₃ + T₅
 T7. T₄ + T₅
 T8. Control (1part cow dung: 2 parts water)

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