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Effect of growing media on growth, development and establishment of low chilling variety of apple "HRMN-99" under Prayagraj agro climatic conditions

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Abstract
The present investigation or Experiment entitled "Effect of Growing Media on Growth, Development and Establishment of Low Chilling Variety of Apple "HRMN-99" under Prayagraj Agro Climatic Conditions.*"* was under taken at Department of Horticulture, Sam Higginbottom University of Agriculture, Technology and Sciences, Prayagraj, India during 2018-19. The experiment was laid out in randomized block design with three replications and 9 treatments separately. The material used in the investigation was organic manures. Result showed significant effect on maximum plant height (76.33cm), number of Branches (3.17), number of Leaves (32.50), plant spread area (240.23cm^2), survival percentage (100%), and minimum Mortality percentage (00%) was in treatment T_2 [Vermicompost +LC+FYM (2:1:1)]under Prayagraj agro climatic conditions.

Keywords: Apple "HRMN-99, vermicompost, leaf compost, FYM, mortality, survival percentage

Introduction
Apple (*Malus* x *domestica* Borkh.) is one of the most important temperate fruit crops of North-Western Himalayan region in India. It belongs to family Rosaceae. It is liked throughout the world by all the people due to its pleasant taste and nutritional value. Apple is one of the leading fruits which are being grown in temperate region of the world. It's beautiful appearance, crispy flesh, pleasant flavour and sweet taste attract the consumer's and fetch high prize (Ali *et al*., 2004) [1]. In the past it was generally regarded as a crop of the temperate zones but is increasingly cultivated under sub-tropical and even tropical conditions (Luckwill 1984) [10]. This has been made possible by selection of adapted cultivars, and by both technological innovations and modifications to standard temperate-zone practices. Apples are part in all food diets and its therapeutic value is well known for different illness (determines the absorption of gastric secretions, the elimination of toxins and has diuretic effect). Organic acids are an important component of fruit flavour and malic acid is the predominant organic acid in apple fruits (Campeanu *et al*., 2009) [2]. Malic acid is the major component of apple that is found to maintain the liver in a healthy condition and it helps in digestion process (Suni *et al*., 2000) [13].
Normally apple is grown in temperate regions of India and mostly the states include Jammu and Kashmir, Himachal Pradesh and North Eastern states. If apple can be successfully grown in plains areas of India which having mostly subtropical climate than it will increase the scope of low chilling apple cultivation in subtropical and tropical climates of India. It will benefit the small and marginal farmers to start small scale apple orchards due to higher market value of this fruit round the year in other parts of India than its traditional growing areas. Increase in apple production will also encourage to go for production of different post harvest products and increase in export amount will give us more foreign dollars. Increase in awareness and consumption of low chilling apple among people will increase the health status of people staying in subtropical and tropical climates of India.

Materials and Methods
The following experiment was conducted in Randomized Block Design (RBD) method with 9 treatments and 3 replications at Research Farm, Department Horticulture, Naini Agricultural Institute, Sam Higginbottom University of Agriculture, Technology and Sciences, Prayagraj during 2018-2019.

Table 1: Treatment combinations

Notation	Combinations
T_0	Control
T1	Vermicompost +LC+FYM (1:1:1)
T_2	Vermicompost +LC+FYM (2:1:1)
T_3	Vermicompost +LC+FYM (1:2:1)
T_4	Vermicompost +LC+FYM (1:1:2)
T_5	LC+FYM (1:2)
T_6	LC+FYM (2:1)
T_7	LC+FYM (1:1)
T_8	Vermicompost +LC (1:2)

Some important factors of HRMN-99 variety

It is a low chilling apple variety noticed the resistance of an apple plant to climatic changes in 1999 by Hariman Sharma. This new variety is resistant to scab disease. Due to higher sugar acid ratio, higher total soluble solids, attractive colour and higher self-life this variety overcomes all most all the demerits of low chilling apple variety. One year old uniform apple plants planted at 3 x 1.5 m apart were taken in the present investigation. Manure, fertilizer and other orchard management practices were followed as per recommended package and practices for apple. One year old uniform apple plants planted at 3 x 1.5 m apart were taken in the present investigation. Manure, fertilizer and other orchard management practices were followed as per recommended package and practices for apple.

Results and Discussion

The maximum survival percentage of low chilling variety of Apple was observed with treatment T_2 [Vermicompost +LC+FYM (2:1:1)] which was 100.00 per cent, followed by treatment T_3 [Vermicompost + LC+FYM (1:2:1)] (98.10%) and Minimum survival percentage showed with treatment T_0 (control) (68.65%). These results are in support with Jain *et al.* (2017) [7] and Dwivedi and Agnihotri (2018) [4]. With regard to mortality percentage minimum mortality percentage recorded with treatment T_2. The treatment combination [Vermicompost +LC+FYM (2:1:1)] in T_2 retained no mortality percent, closely followed by treatment T_3 [Vermicompost +LC+FYM (1:2:1)] (1.90%), while the maximum mortality percentage was recorded with treatment T_0 (control) (31.35%). Similar findings were reported with Verma and Sharma (2010) [19]. In case of height maximum plant height increases in treatment T_2. The treatment combination T_2 [Vermicompost +LC+FYM (2:1:1)] showed the maximum plant height (80.03cm) at 120 DAS, followed by treatment T_3 [Vermicompost +LC+FYM (1:2:1)] (76.33cm) and Minimum plant height observed with T_0 (control) (57.55cm) at 120 DAS. Similar findings were reported by Verma *et al.* (2010) [19], Singh *et al*. (2011) and Kamatyanatti *et al.* (2019) [8].

In term of days to bud break, treatment T_2 [Vermicompost + LC + FYM (2:1:1)] has taken minimum days for bud break (10.00), followed by treatment T_3 [Vermicompost +LC+FYM (1:2:1)] (12.30), whereas Maximum days to bud break observed with T_0 (control) (23.33). These findings are in accordance with Ram *et al*. (2007) [18] and Meena *et al.* (2017) [12]. The maximum number of leaves at 120 DAS recorded in treatment T_2 [Vermicompost +LC+FYM (2:1:1)] (32.50), followed by treatment T_3 [Vermicompost +LC+FYM (1:2:1)] (30.67) and minimum number of leaves per plant (10.13) was noticed in T_0 (control) at 120 DAS. Similar findings were reported by Grzyb *et al.* (2012) [5] and Gupta *et al*. (2019) [6]. The number of branches was noticed maximum (3.17) at 120 DAS with treatment T2 [Vermicompost + LC + FYM (2:1:1)], followed by treatment T_3 [Vermicompost +LC+FYM (1:2:1)] (3.00), while Minimum number of branches observed with T_0 control (0.33) at 120 DAS. The maximum plant spread area (cm^2) increased with treatment T_2 [Vermicompost +LC+FYM (1:2:1)] which was (240.23cm^2) at 120 DAS, followed by treatment T_3 [Vermicompost +LC+FYM (1:2:1)] (232.44cm^2) and Minimum plant spread area (48.33cm^2) at 120 DAS was observed with T_0 control. Similar findings were reported by Kumar *et al.* (2017) [9] and Dwivedi and Agnihotri (2018) [4]. Result is also show in tabular (table-2) and in figure (fig-1) form.

Table 2: Effect of Growing Media on establishment and vegetative growth of Low Chilling Variety of Apple

Treatments No.	Treatments	Survival Percent	Mortality Percent	Plant height (cm)	Bud break (days)	Number of Leaves	Number of Branches	Plant spread area (cm^2)
T_0	Control	68.65	31.35	57.55	23.33	10.12	0.33	48.33
T_1	Vermicompost + LC+FYM (1:1:1)	90.21	9.79	70.67	15.00	28.83	2.33	142.75
T_2	Vermicompost + LC+FYM (2:1:1)	100.00	0.00	80.03	10.00	32.50	3.17	240.23
T_3	Vermicompost + LC+FYM (1:2:1)	98.10	1.90	76.33	12.30	30.67	3.00	232.44
T_4	Vermicompost + LC+FYM (1:1:2)	93.43	6.57	73.48	14.50	30.00	2.67	150.76
T_5	LC+FYM (1:2)	85.17	14.83	61.42	20.67	14.50	1.33	87.64
T_6	LC+FYM (2:1)	87.33	12.67	62.15	18.50	25.00	2.00	142.14
T_7	LC+FYM (1:1)	78.67	21.33	60.03	23.17	13.17	0.67	54.45
T_8	Vermicompost + LC (1:2)	95.50	4.50	74.50	14.33	30.33	2.83	224.38
	F-test	S	S	S	S	S	S	S
	C. D. at 0.05%	2.33	1.71	2.23	2.00	2.63	0.22	2.31
	S.Ed (±)	1.10	0.80	1.05	0.95	1.24	0.10	1.09

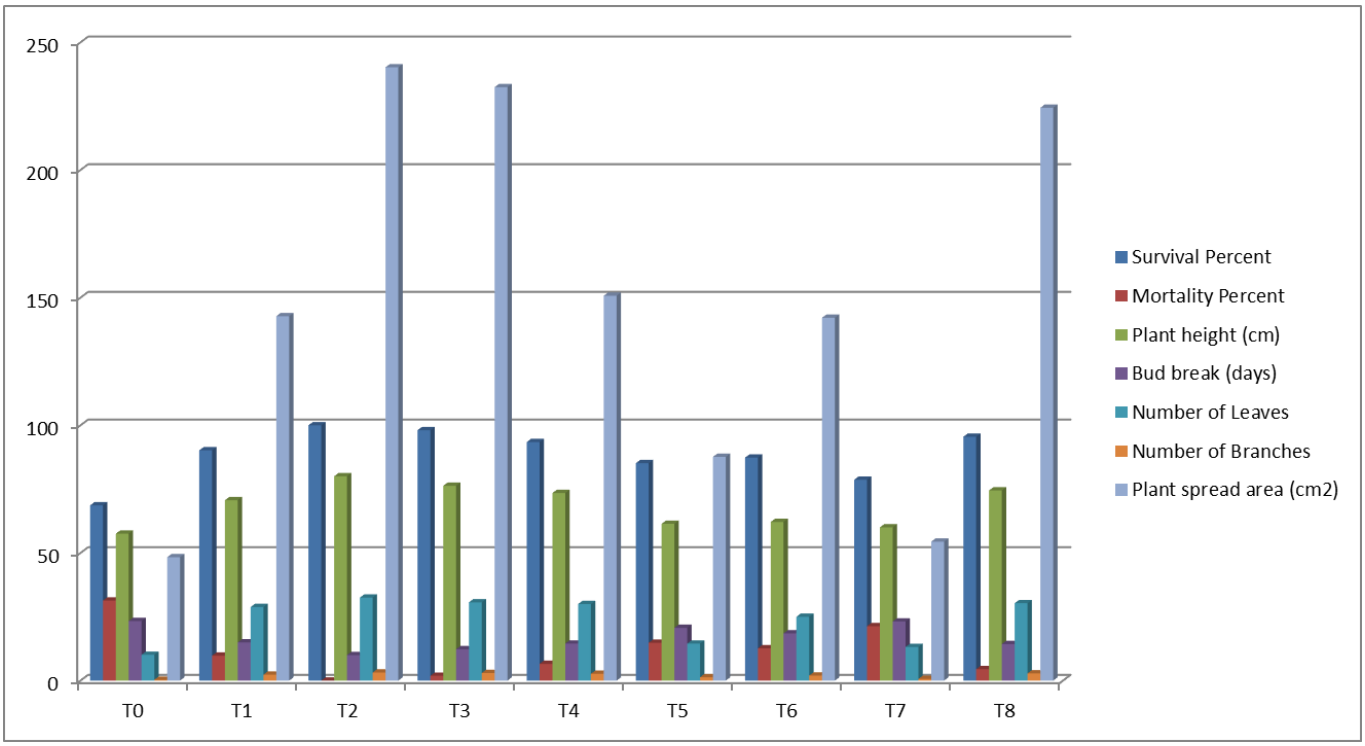

Fig 1: Effect of Growing Media on establishment and vegetative growth of Low Chilling Variety of Apple

Conclusion

On the basis of above findings it is concluded that the treatment T_2 [Vermicompost + LC + FYM (2:1:1)] was found superior for Growth, Survivability and Establishment of low chilling variety of Apple under Prayagraj agro climatic condition. Therefore further trials need to be done to confirm the findings.

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