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# Effect of different plant growth promoters on sprouting and survival in bush pepper (*Piper nigrum* L.)

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**Abstract**
The experiment was conducted at Educational farm of College of Horticulture, Dapoli, Dr. Balasaheb Sawant Konkan Krishi Vidyapeeth, Dapoli, Dist. Ratnagiri during the year 2019-20 to assess the effect of different plant growth promoters on survival and growth rate of bush pepper. Experiment was laid out Randomized Block Design (RBD) with three replication with ten plant growth promoters treatments. The treatments were $T_1$-Vermiwash 5% drenching, $T_2$-Vermiwash 10% drenching, $T_3$-Vermiwash 15% drenching, $T_4$-Cow urine 5% drenching, $T_5$-Cow urine 10% drenching and $T_6$-Cow urine 15%,$T_7$ –Humic acid 0.05% drenching, $T_8$ - Humic acid 0.1% drenching, $T_9$ - Humic acid 0.2% drenching, $T_{10}$ –Keradix. Early sprout initiation (16.04 DAP) was observed in treatment $T_9$ - Humic acid 0.2% drenching .Significantly minimum number of days required for peak sprouting (38.16) were taken in $T_9$ - Humic acid 0.2% drenching and minimum number of days required for last sprouting (50.13) was recorded in treatment $T_9$ - Humic acid 0.2% drenching. Highest sprouting (82.05 per cent) highest survival (55.45 per cent) were also observed in treatment $T_9$ - Humic acid 0.2% drenching.

**Keywords:** Bush pepper, plant growth promoters, survival and sprouting percentage)

## Introduction
Black pepper (*Piper nigrum* L.) is commonly known as king of spice belongs to family piperaceae. It is a most oldest and most popular spices in the world. Black pepper is a flavouring vine in a “piperaceae” family that is cultivated for its fruit. This crop is mostly cultivated in tropical and subtropical regions. It is widely utilized for medicinal and preservative purpose and also perfumery. Black pepper have many pharmacological actions, because of its pungency. It contains pungent alkaloids piperine (I – peperoyal piperidine (Shukla *et al*., 2018) [9]. Five distinct types of stem portions can be identified in the shoot system of pepper vine. The main stem which originates from a seed or from a stem cutting. It climbs on a support with aid of aerial or adventitious roots. Runner shoots are produced from the basal portion of the main stem, growing at right angle to the main stem, usually restricted up to 50cm from the ground. Fruiting branches (Plagiotropes) are produced from the nodes of the main stem, bearing spikes. The vegetatively propagated plants of such branches are known as bush pepper and the propagation success and growth of such plants are comparatively less. Therefore, to improve success and for rapid growth the the application of growth promoters needs to be tried. With this view, the present investigation was undertaken to study the effect of plant growth regulator on sprouting and survival of bush pepper.

## Material and Methods
The experiment was conducted at Educational farm of College of Horticulture, Dapoli, Dr. Balasaheb Sawant Konkan Krishi Vidyapeeth, Dapoli, Dist. Ratnagiri during the year 2019-20 to assess the effect of different plant growth promoters on survival and growth rate of bush pepper. The experiment was laid out Randomized Block Design (RBD) with three replication with ten plant growth promoters treatments.The treatments were $T_1$ (Vermiwash 5% drenching), $T_2$ (Vermiwash 10% drenching), $T_3$ (Vermiwash 15% drenching), $T_4$ (Cow urine 5% drenching), $T_5$ (Cow urine 10% drenching) and $T_6$ (Cow urine 15%),$T_7$ (Humic acid 0.05% drenching), $T_8$ (Humic acid 0.1% drenching), $T_9$ (Humic acid 0.2% drenching), $T_{10}$ (Keradix). The bush pepper cuttings were raised in 10 cm X 20 cm size polythene bags. The recommended cultural practices (Irrigation, weeding, plant protection etc.) were followed uniformly to experimental plots. The drenching with different plant growth promoters was done upto six month i.e. 15, 30, 45, 60, 75, 90, 105, 120, 135, 150,165, 180 DAP respectively. The observation on sprouting attributes and survival percentage were recorded.

Statistical analysis of the data was carried out by standard method of analysis of variance as given by Panse and Sukhatme (1995) [6].

**Results and Discussion**

The data on days required for initiation of sprout days after planting was presented in Table 1.The data revealed that the significantly early sprout initiation (16.04 DAP) was observed in treatment $T_9$ ( Humic acid 0.2% drenching). This treatment was at par with the treatment $T_3$ (Vermiwash 15% drenching) (16.43 DAP). The delayed sprouting (21.48 days) was observed in $T_4$ (Cow urine 5% drenching) which was at par with $T_{10}$ (Keradix) (21.42 days) and $T_5$ (Cow urine 10% drenching) (20.53 days).

The data regarding day required for peak sprouting in bush pepper crop is presented in Table 1. From data, it is cleared that the significantly minimum number of days required for peak sprouting (38.16) were taken in $T_9$ (Humic acid 0.2% drenching) & was at par with $T_3$ (Vermiwash 15% drenching). Also treatment $T_5$ (Cow urine 10% drenching) (40.14 days) which was at par with $T_6$ (Cow urine 15% drenching )(40.14 days ), $T_2$ (Vermiwash 10% drenching) (40.48 days), $T_8$ (Humic acid 0.1% drenching) (40.83 days), $T_7$ (Humic acid 0.05% drenching) (41.14 days ),$T_1$ (Vermiwash 5% drenching) (41.40 days ). The maximum number of days taken for peak sprouting (45.52 days ) was in taken for peak sprouting (45.52 days ) was in control treatment $T_{10}$ (Keradix) which wad at par with $T_4$ (Cow urine 5% drenching) (44.11 days ).

In general, humic acid supplies both macro and micro nutrients to growing plants, increase soil fertility and productivity, increases water holding capacity and enhances seed germination. Humic acid also reduces the other chemical fertilizer requirements, increases aeration of soil. Result analogous to above findings with humic acid with the concentration of 0.25% showed maximum seed germination (100%) (Prakash *et al.,* 2014) [7].

Earliness in sprouting may be due to utilization of stored carbohydrates present in cuttings, nitrogen and other factors with the aid of growth regulators (Chandramouli, 2001) [2]. Humic acid and cow urine contain auxins; auxins are involved in the chelation of iron for the plant, improving growth, health and nutrient intensity of the plant, especially the development of the root system of the plant. (Jackson, 1973) [4] The weather condition during experimental period was also congenial for increasing the cell activity for formation of root. Hence the number of days required for sprouting was less in treatment of humic acid followed by cow urine.

Similar findings were recorded by Sandor *et al.,* (2015) [8] in pomegranate. Data regarding days required for last sprouting in bush pepper crop presented in Table 1. From data revealed that significantly minimum number of days required for last sprouting (50.13 days) was recorded in treatment $T_9$ (Humic acid 0.2% drenching) followed by $T_6$(Cow urine 15% drenching )(56.14 days ). However, delayed last sprouting was recorded in treatment $T_1$ (Vermiwash 5% drenching) (60.62 days).

Earliness in sprouting and also peak sprouting in bush pepper due to humic acid 0.2% drenching and vermiwash 15% drenching might be due to utilization of stored carbohyadrates present in cutting. Similar findings with humic acid 0.25 per cent concentration was recorded for seed germination in *Raphanus sativus* by (Prakash *et al*.,2014) [7], (Sandor *et al*., 2015) [8] in pomegranate with 50 per cent humic acid.

Data presented in Table 2 indicated that significantly maximum sprouting (82.05 per cent) was recorded in treatments $T_9$ i.e Humic acid 0.2% drenching followed by $T_3$ (Vermiwash 15% drenching ) (94.00),$T_6$ (Cow urine 15% drenching) (93.66),$T_5$ (Cow urine 10% drenching) (92.66),$T_2$ (Vermiwash 10% drenching) (92.33),$T_7$ (Humic acid 0.05% drenching) (92.00),$T_1$ (Vermiwash 5% drenching ) (91.33),$T_8$ (Humic acid 0.1% drenching)(91.00),$T_4$ (Cow urine 5% drenching) (89.00).

The lowest sprouting per cent was observed in $T_{10}$ i.e. keradix (68.90). Root volume plays an important role in the sprouting of cutting. Humic acid and cow urine contain auxins which might be involved in the development of the root system of the plant. (Jackson, 1997) [5]. The weather condition during experimental period was also congenial for increasing the cell activity for formation of root. Hence maximum per cent sprouting was obtained in treatment of humic acid.Similar findings were recorded by Sandor *et al.,* (2015) [8] reported for pomegranate cuttings with 50% concentration of humic acid. In black pepper, Bendre (2019) [1] also obtained the similar results.

The results presented in Table 2 revealed that at 180 DAP, the highest per cent survival was recorded in treatment $T_9$ i.e. Humic acid 0.2% (55.45) which was at par with $T_3$ i.e. vermiwash 15% drenching (54.82%), $T_8$ i.e. humic acid 0.1% drenching ( 54.13%), $T_5$ i.e. cow urine 10% drenching (53.18%), $T_2$ i.e. vermiwash 10% drenching (53.16%), $T_7$ i.e.Humic acid 0.05% (51.54%) and $T_1$ i.e. vermiwash 5% drenching (51.46%) respectively.

Minimum per cent survival observed in treatment $T_{10}$ i.e keradix (44.82%) which was at par with $T_4$ i.e. cow urine10% (47.14%) and $T_6$ i.e. cow urine 15% drenching (48.81%) respectively.

The cuttings treated with humic acid resulted in development of effective root system and increase in number and length of roots per cutting which might have influenced the uptake of nutrients and water.

The overall performance in relation to growth parameters of root and shoots were comparatively better in this treatment which ultimately increased the survival percentage. Hence the significant effect was observed in the survival per cent when treated with humic acid. The results are analogues with the earlier findings of Gawas *et al*. (2019) [3].

From the present investigation, it is inferred that the drenching with humic acid @ 0.2% is advantageous for early sprouting with higher sprouting and survival percentage in bush pepper cutting propagation.

**Table 1:** Effect of different plant growth promoters on number of days to sprout in bush pepper cuttings

| Treatments | First sprouting | Peak sprouting | Last sprouting |
|---|---|---|---|
| $T_1$ -VW 5 % DR | 19.49 | 41.40 | 60.62 |
| $T_2$ - VW 10% DR | 19.52 | 40.48 | 58.81 |
| $T_3$ - VW 15 % DR | 16.43 | 39.74 | 57.13 |
| $T_4$ - CU 5% DR | 21.48 | 44.11 | 61.14 |
| $T_5$ -CU 10% DR | 20.53 | 40.14 | 56.14 |
| $T_6$ -CU 15 % DR | 19.18 | 40.14 | 52.15 |
| $T_7$ -HA 0.05 % DR | 18.85 | 41.14 | 60.12 |
| $T_8$ -HA 0.1% DR | 17.40 | 40.83 | 56.16 |
| $T_9$ -HA 0.2% DR | 16.04 | 38.16 | 50.13 |
| $T_{10}$- Keradex (control) | 21.42 | 45.52 | 60.46 |
| Mean | 19.37 | 41.69 | 57.90 |
| S.Em± | 0.42 | 0.53 | 0.56 |
| CD at 5 % | 1.27 | 1.58 | 1.69 |

**Table 2:** Effect of different plant growth promoters on sprouting and survival percentage in bush pepper cuttings

| Treatments | Sprouting (%) | Survival (%) |
|---|---|---|
| $T_1$ -VW 5 % DR | 91.33 (72.88)* | 51.46 (45.82) |
| $T_2$ - VW 10% DR | 92.33 (73.93) | 53.16 (46.81) |
| $T_3$ - VW 15 % DR | 94.00 (75.85) | 54.82 (47.77) |
| $T_4$ - CU 5% DR | 89.00 (70.64) | 47.14 (43.35) |
| $T_5$ -CU 10% DR | 92.66 (74.39) | 53.18 (46.83) |
| $T_6$ -CU 15 % DR | 93.66 (75.56) | 48.81 (44.31) |
| $T_7$ -HA 0.05 % DR | 92.00 (73.59) | 51.54 (45.87) |
| $T_8$ -HA 0.1% DR | 91.00 (72.61) | 54.13 (47.37) |
| $T_9$ -HA 0.2% DR | 98.00 (82.05) | 55.45 (48.12) |
| $T_{10}$- Keradex (control) | 87.00 (68.90) | 44.82 (42.02) |
| Mean | 74.04 | 45.83 |
| S.Em± | 0.98 | 0.82 |
| CD at 5 % | 2.91 | 2.44 |

(*Figures in parenthesis indicates the arcsine values)

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