
ORIGINAL ARTICLE

Effect of Bio-fungicide (Leaf extract) and Synthetic Fungicide on Seed Germination, Seedling Development and Seedling vigor in Tomato var.NS-2535

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ABSTRACT

The effect of 5%,10%,15%,20%, 25%,50%,75% and 100% concentrations of biofungicide *Vitex negundo* L. and synthetic fungicide Dithane M-45 on seed germination, seedling development and seedling vigor index in Tomato. The synthetic fungicide Dithane M-45 did not affect any influence on the seed germination, root & shoot growth and vigor index. The higher concentration of fungicide application could be detrimental for the seed germination and seedling development. The leaf extract *Vitex negundo* L. which were used to control the pathogen did not however cause any negative effect on the germination percentage, root and shoot growth and also on vigor index. In fact, the extract tested exhibited an enhancing effect more even at higher concentrations and therefore the extracts may be safely used as an alternative to fungicide to improve seed germination and seedling development.

KEY WORDS: Synthetic fungicide, Leaf extract, efficacy, seed germination, vigor index

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INTRODUCTION

Tomato (*Lycopersicon esculentum* Mill.) belongs to the family Solanaceae and is one of the most remunerable and widely grown vegetable crops in the world. Among the vegetables, tomato ranks next to potato in world acreage however ranks first among the processing crops [1]. The major tomato growing countries are China, USA, Italy, Turkey, India and Egypt. Total area under tomato is 4582438 thousand ha with production of 150513813 thousand tons and with productivity of 32.8 tons/ha. Uttar Pradesh, Maharashtra, Karnataka, Bihar and Orissa are major tomato growing states in India (Indian Horticulture Database, 2011). India ranks 2nd in the production of tomato with annual production of 16826.0 thousand tons from an area of 865.0 thousand ha, With productivity of 19.5 tons/ha. In Maharashtra State annual production of tomato was 738.0 thousand tons from an area of 52.0 thousand ha [1]. Biological screening of plant extracts is carried out throughout the world for the determination of their antifungal activity. Synthetic chemicals used to control plant diseases not only pollute the environment, but are also harmful to human health. Tomata is grown in Rahata Taluka of Ahmednagar district in Kharif (Rainy) as well as in Rabi (winter) season also. Our farmers often use most common method for controlling these pathogens is the spraying synthetic fungicide such as Dithane M-45. Hence the present investigation is planned to investigate the effect of different concentrations of leaf extract and synthetic fungicide on germination of seeds, seedlings development and seedling vigor index.

MATERIAL AND METHODS

Seed germination was carried out by paper towel method [2]. Seedling Vigour Index (SVI) was determined on the basis of seed germination as well as shoot and root length of seedling [4]. Also, it was calculated by

using following formula, $SVI = (\text{mean root length} + \text{mean shoot length}) \times \% \text{ seed germination}$ where, SVI= Seedling Vigour Index [3].

Healthy seeds of tomato var.NS-2535 were treated by soaking them for 24 hours indifferent concentrations (5%,10%,15%,20%,25%,50%,75% and 100%) of synthetic fungicide (M-45) and transferred on the moist germination paper for testing seed germination and SVI study adapting rolled towel paper method ISTA [5].Seeds were arranged on moist kraft paper towel in 10 rows, with 10 seeds in each row keeping space of approximately 3cm at lower, left and right margins. The paper towel was rolled from right end, wrapped in a polythene paper and the ends were tightened with rubber band and placed vertically in a seed germinator in upward direction of open end at 20°C to 30° C temperature. A minimum of four hundred seeds were used in four replicates with 100 seeds in each. One set of 400 seeds served as a control. Germination of seeds was observed on 5th and 7th day. After 14days, % of seed germination and early seedling growth parameters viz. root length and shoot length were recorded. Result of germination test was calculated as the averages of 4 x 100 seed replicates and expressed as percentage of the number of normal seedlings. Root and shoot length was measured with the help of scale. Per cent germination was calculated using the following formula ISTA [5].

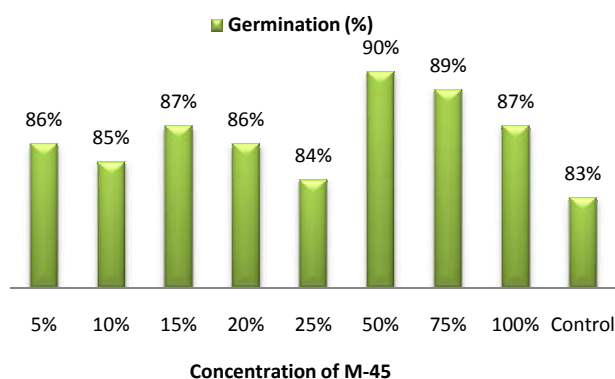
$$\text{Percent (\%) seed germination} = \frac{\text{No. of germinated seeds}}{\text{Total No. of seeds}} \times 100$$

RESULTS AND DISCUSSION

The results reveal that the fungicide Dithane M-45 did not effect any influence on the seed germination, root & shoot growth and vigour index on Tomato var.Ns-2535. However at the lowest concentration of 5 %conc.The total seedling length and vigour index was more and less at highest concentration of 100 %conc. Thus higher concentration of fungicide application could be detrimental for the seed germination and seedling development. The leaf extract *Vitex negundo*L. did not cause any negative effect on the germination percentage, root and shoot growth and also on vigour index. In fact, the extract tested exhibited an enhancing effect more so at higher concentrations in these parameters when compared with control suggesting that some bio-compounds in leaves are acting as growth activators. Like synthetic fungicide, this plant extract did not showed any negative impact on the seed germination and seedling even at higher concentrations and therefore the extracts may be safely used as an alternative to fungicide to improve seed germination and seedling, development.

Table 1: Efficacy of synthetic Fungicide (M-45) on seed germination and seedling development in Tomato var. NS-2535

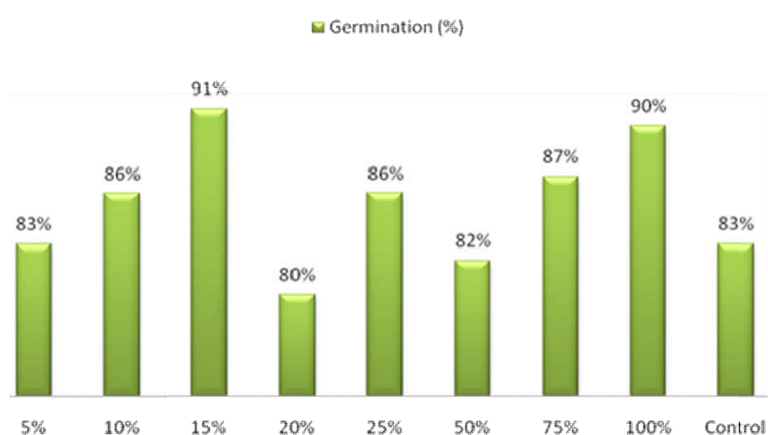
Sr. No.	M-45 conc.	Germination (%)	Mean root length (cm)	Mean shoot length(cm)	Total length of seedling (cm)	Seedling Vigour Index(VI)
1	5%	86%	9.74	8.40	18.14	1560.04
2	10%	85%	8.81	8.62	17.43	1481.55
3	15%	87%	9.86	7.95	17.81	1549.47
4	20%	86%	9.39	7.92	17.31	1488.66
5	25%	84%	8.62	7.56	16.18	1359.12
6	50%	90%	8.77	6.86	15.63	1406.7
7	75%	89%	7.99	7.21	15.20	1352.8
8	100%	87%	7.50	6.55	14.05	1222.35
9	Control	83%	7.55	6.55	14.10	1170.3



Graph 1: Efficacy of Fungicide (M-45) on seed germination and seedling development in Tomato var. NS-2535

Table No. 2: Efficacy of *Vitex negundo* L. leaf extract on seed germination and seedling development in Tomato var. NS-2535

Sr. No.	Leaf extract conc.	Germination (%)	Mean root length (cm)	Mean shoot length(cm)	Total length of seedling (cm)	Seedling Vigour Index(SVI)
1	5%	83%	8.59	6.84	15.43	1280.69
2	10%	86%	9.26	8.35	17.61	1514.46
3	15%	91%	8.84	7.12	15.96	1452.36
4	20%	80%	9.08	7.22	16.30	1304.00
5	25%	86%	9.23	8.10	17.33	1490.38
6	50%	82%	8.89	8.45	17.34	1421.88
7	75%	87%	9.26	8.35	17.61	1532.07
8	100%	90%	9.11	8.53	17.64	1587.60
9	Control	83%	7.55	6.55	14.10	1170.3

Different concentrations of leaf extract- *Vitex negundo* L.**Graph 2: Efficacy of *Vitex negundo* L. leaf extract on seed germination and seedling development in Tomato var. NS-2535.****REFERENCES**

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