



Evaluating the efficiency of Allwin wonder and Allwin top on germination of crop seeds and Vigour index

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Abstract

A laboratory germination experiment was conducted at Department of Environmental Sciences, Tamil Nadu Agricultural University, Coimbatore to study the effect of agro chemicals such as Allwin Wonder and Allwin Top. Allwin wonder and Allwin top contains humic substances, macro and micro nutrients such as N, P, K, Fe, Zn and Mg. Among the different treatment, Allwin wonder @ 3.125 kg ha⁻¹ and Allwin top @ 312.5 g ha⁻¹ recorded the highest seed germination, shoot length, root length, dry matter production and vigour index of maize [CoH(M) 5], sunflower (TCSH 1), tomato (PKM 1) and green gram (CO 4).

Keywords: Agro chemicals, Allwin wonder, Allwin top, humic substances and Germination

Introduction

Humic acid is a commercial product contains many elements which improve the soil fertility and increasing the availability of nutrient elements and consequently affected the plant growth and yield. Humic acid particularly used to remove or decrease the negative effects of chemical fertilizers and the same chemicals from the soil (Hartwigson and Evans, 2000). One of the used organic-mineral fertilizers is the humic acid. Humic acid is one of the major components of humic substances. Humic matter is formed through the chemical and biological humification of plant and animal matter and through the biological activities of micro-organisms (Anonymous, 2010). The effects of humic substances on plant growth depend on the source and concentration, as well as on the molecular fraction weight of humus. Lower molecular size fraction easily reaches the plasma lemma of plant cells, determining a positive effect on plant growth, as well as a later effect at the level of plasma membrane,

that is, the nutrient uptake, especially nitrate. Humic substances influence both respiration and photosynthesis (Nardi *et al.*, 2002).

Humic substances have a very strong influence on the growth of plant roots. When humic and fulvic acids are applied to soil, enhancement of root initiation and increased root growth may be observed (Pettit, 2004). The current study aim was to investigate the influence the application of Allwin wonder and Allwin top which contain humic substances on germination of maize, sunflower, green gram and tomato.

Materials and Methods

Different concentrations of Allwin wonder and Allwin top were studied for their influence on seed germination and Vigour index of maize, sunflower, green gram and tomato. Germinated was tested using paper towel. The experiment was conducted in CRD and replicated three times. The treatment details are as follows.

Treatment details

T ₁	: Control
T ₂	: Allwin Wonder @ 1.875 kg ha ⁻¹
T ₃	: Allwin Wonder @ 2.5 kg ha ⁻¹
T ₄	: Allwin Wonder @ 3.125 kg ha ⁻¹
T ₅	: Allwin Top @ 187.5 g ha ⁻¹
T ₆	: Allwin Top @ 250 g ha ⁻¹
T ₇	: Allwin Top @ 312.5 g ha ⁻¹

Germination percentage

The germination test was carried out in a paper medium (Roll towel) using 4 x 100 seeds (ISTA, 1999) in a germination room maintained at 25 ± 1°C temperatures and 95 ± 3 percent relative humidity. After seven days, germination of maize and green gram seeds were counted and after ten days, germination of sunflower and tomato seedlings was counted and expressed in percentage.

Root length

At the time of germination count, ten normal seedlings were selected at random from each replication and measured for root length. Root length was measured from the point of attachment of the seed to the tip of the primary root. The mean values were recorded and expressed in cm.

Shoot length

The seedlings used for measuring root length were also used for measuring the shoot length. The shoot length was measured from the point of attachment of seed to the tip of the leaf and the mean values were recorded and expressed in cm.

Dry matter production

The seedlings after measuring the length of root and shoot were placed inside a paper cover and dried for four hours in the sun and then in a hot air oven maintained at 85 °C for 24 h. Then, they were cooled in a desiccator for 30 minutes and weighed. The dry matter production was expressed in mg 10 seedlings⁻¹.

Vigour index

Vigour index (VI) was calculated by using the methods suggested by Abdul-Baki and Anderson (1973).

VI = Germination percentage x [root length (cm) + shoot length (cm)]

Results and Discussion

Effect of Allwin wonder and Allwin top on germination of crops

Among the different concentrations of Allwin wonder and Allwin top, the A.W @ 3.125 kg ha⁻¹ recorded the highest germination of 88 per cent and 96 per cent in sunflower and green gram, respectively (Fig.- 1). In case of maize, both A.W @ 3.125 kg ha⁻¹ and A.W @ 2.5 kg ha⁻¹ recorded maximum germination of 96 per cent. The highest germination of 84 % in tomato seeds was observed in three treatments viz., A.W @ 3.125 kg ha⁻¹, A.T @ 250 g ha⁻¹ and A.T @ 312.5 g ha⁻¹. Whereas control recorded the lowest germination percentage of 80, 72, 60 and 72 percent for maize, sunflower, tomato and green gram, respectively.

The significant variation in shoot length and root length were recorded. Among the treatments, A.W @ 3.175 kg ha⁻¹ registered the highest shoot length of 16.3, 16.5, 4.82 and 19.3 cm for maize, sunflower, tomato and green gram, respectively (Table - 1). The lowest shoot length of 12.6, 12.4, 3.5 and 17.1 cm were recorded in control for maize, sunflower, tomato and green gram, respectively. The highest root length in maize (21.4 cm) and sunflower (22.6 cm) were registered with A.W @ 2.5 kg ha⁻¹. With respect to tomato and green gram, A.W @ 3.125 kg ha⁻¹ registered the highest root length of 7.55 and 19.9 cm, respectively. The lowest root length of 17.8, 17.4, 5.45 and 14.1 cm were recorded in maize, sunflower, tomato and green gram, respectively in control (T₁).

Among the different concentrations, the A.W @ 3.175 kg ha⁻¹ recorded the highest dry matter production of 1.78, 0.53 and 0.42 g 10 seedling⁻¹

Table - 1. Effect of Allwin wonder and Allwin top on germination percentage, shoot length and root length of crop seeds using roll towel method

Treatments	Shoot length (cm)				Root length (cm)			
	Maize	Sunflower	Tomato	Green gram	Maize	Sunflower	Tomato	Green gram
T ₁ : Control	12.6	12.4	3.50	17.1	17.8	17.4	5.45	14.1
T ₂ : AW@1875kg ^{ha} ⁻¹	14.9	14.5	4.15	19.7	19.6	19.2	6.68	17.1
T ₃ : AW@25kg ^{ha} ⁻¹	15.1	15.8	4.80	18.5	21.4	22.6	7.25	18.3
T ₄ : AW@3.125kg ^{ha} ⁻¹	16.3	16.5	4.82	19.3	20.1	21.3	7.55	19.9
T ₅ : AT@1875g ^{ha} ⁻¹	13.6	13.5	3.65	17.7	19.1	18.7	5.85	15.8
T ₆ : AT@250g ^{ha} ⁻¹	13.3	15.2	4.63	18.7	20.3	18.1	6.08	14.5
T ₇ : AT@3125g ^{ha} ⁻¹	14.2	15.2	3.85	18.6	20.5	18.5	6.23	16.6
Mean	14.3	14.7	4.20	18.5	19.8	19.4	6.40	16.6
S.ED	0.245	0.24	0.07	0.32	0.33	0.33	0.11	0.27
CD (0.05)	0.525	0.50	0.14	0.67	0.70	0.71	0.22	0.58

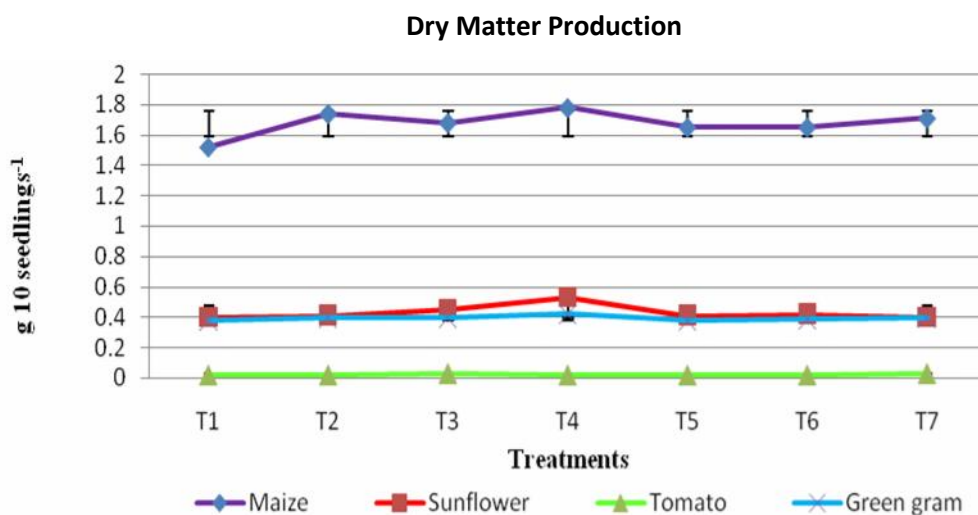


Fig.- 1. Effect of Allwin wonder and Allwin top on germination percentage of maize, sunflower, tomato and green gram using roll towel method

in maize, sunflower and green gram, respectively (Fig.- 2). However the treatments namely A.W @ 2.5 kg ha⁻¹ and A.T @ 312.5 g ha⁻¹ recorded the highest dry matter production (0.03 g 10 seedling⁻¹) in tomato. Control recorded the lowest dry matter production of 1.52, 0.40 and 0.38 g 10 seedling⁻¹ in maize, sunflower and green gram, respectively. In maize and sunflower, the highest vigour index of 3504 and 3686 were registered in treatment

with A.W @ 2.5 kg ha⁻¹. The highest vigour index of 1037 and 3763 for tomato and green gram were registered with A.W @ 3.125 kg ha⁻¹. Invariably, the lowest vigour index (2432, 2384, 537 and 2246) was registered in the control (Fig. - 3).

Allwin wonder and Allwin top contain significant quantities of plant nutrients. Allwin wonder contains melamine, potassium humate, potassium chloride, ferrous sulphate, zinc sulphate,

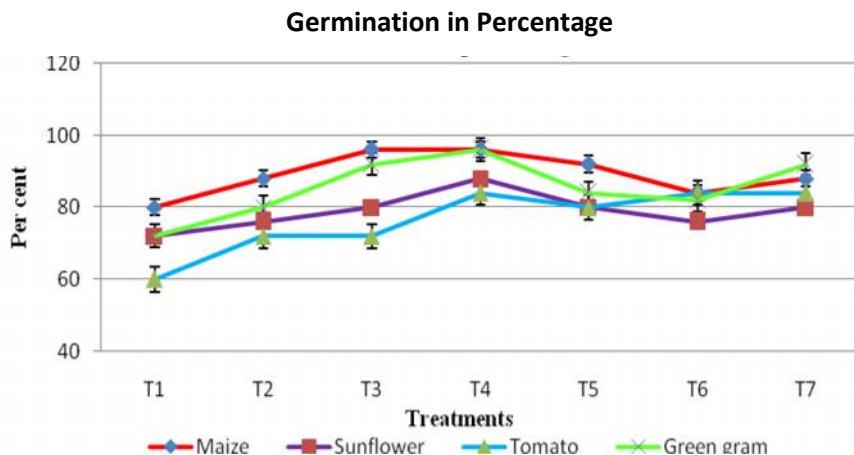


Fig. - 2. Effect of Allwin wonder and Allwin top on dry matter production of maize, sunflower, tomato and green gram using roll towel method

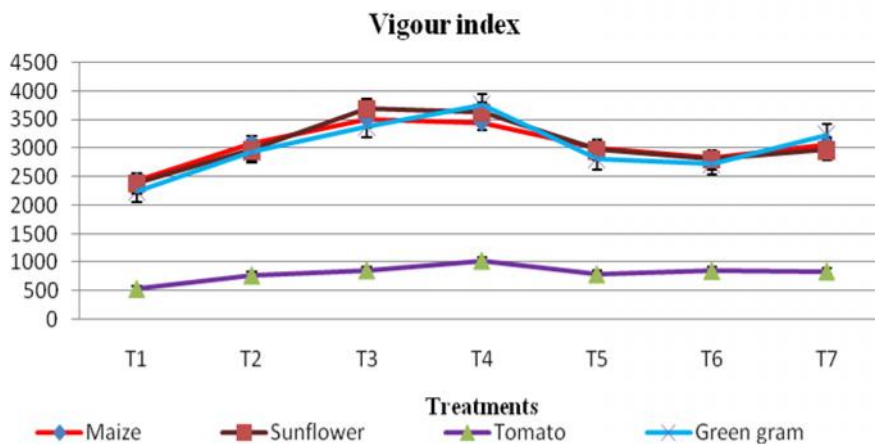


Fig. - 3. Effect of Allwin wonder and Allwin top on vigour index of maize, sunflower, tomato and green gram using roll towel method

Magnesium sulphate and Octoborate at concentrations of 30, 10, 10, 5, 10, 10 and 7 percent respectively. Allwin top contains melamine, mono ammonium phosphate, octoborate, acetyl salicylic acid and potassium humate at concentrations of 40, 10, 20, 1 and 12, percent, respectively. Melamine, potassium humate, potassium chloride, ferrous sulphate, zinc sulphate, magnesium sulphate, mono ammonium phosphate, octoborate and humic acid are widely used in crop production as a plant growth stimulant or as a soil conditioner for enhancing natural resistance against plant diseases and pests (Scheuerell and Mahaffee, 2006).

application of humic substance increases the respiration rate and accelerate the cell division in seeds, which enhances the root meri development and activate the shoot and root growth in the seedlings. Vaughan (1974) proposed that humic acids may primarily increase the root growth by increasing cell elongation or root cell membrane permeability. The soil and foliar application of humic acid increased the shoot, root and dry matter production in various crops viz., sorghum, maize, faba bean and wheat (Rao et al., 1984; Yadav, 1989; Ayman et al., 2009 and Lalila et al., 2009).

Conclusion

The heterocyclic agro chemicals such as Allwin wonder and Allwin top contains plant nutrients and humic substances. Effects of different concentration of Allwin wonder and Allwin top were evaluated using maize, sunflower, tomato and green gram as test crops using roll towel method. Application of AW@3.125 kg ha⁻¹ improved the seed germination, root and shoot length, dry matter production and vigour index of maize (CoH(M) 5), sunflower (TCSH 1), tomato (PKM 1) and green gram (CO 4).

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