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REGULAR ARTICLE

EFFECT OF CHICORY LEAF EXTRACT SEED HARDENING CUM FOLIAR SPRAY TO IMPROVE RESULTANT SEED QUALITY IN SESAME (*SESAMUM INDICUM L.*) CV. TMV₃ UNDER RAINFED CONDITION

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ABSTRACT

An evaluation was carried out to study the effect pre sowing seed treatment and foliar spray with chicory leaf extract on resultant seed quality characters of sesame cv TMV 3. The bulk seeds were graded for uniformity using appropriate round perforated metal sieves of sizes of 5/64" size sieve and were imposed various concentration of chicory leaf extract presowing treatment coupled with foliar spray at different concentration under drought condition. After harvest the resultant seeds were evaluated for its seed qualities. The results revealed that the that the Chicory @ 20 % Pre sowing seed treatment+Chicory foliar spray @ 30 % during pod filling stage significantly increased the resultant seed quality characters of the sesame, when compared to other concentration and control.

Keywords: Sesame, Chicory leaf extract, Germination, Vigour index

INTRODUCTION

Oilseeds, the raw material for vegetable oil, occupy a significant place in India's economy. Next to food grains, oilseeds account for 10 per cent of the cultivated area and value of all agricultural produce [1]. Nearly 85 per cent of the oil and fat needs of the country is primarily met by vegetable oils. India is the third largest producer of oilseeds in the world. No other country has its range of perennial and annual oilseeds. Sesame (*Sesamum indicum L.*) is the third main oilseed crop in India occupying an area of 243.7 lakh hectare with the production of 208.71 million tonnes and productivity level of 856 kg ha⁻¹. In Tamilnadu, it is grown in an area of 1.12 lakh hectare with annual production of 0.66 lakh tonnes and has a productivity level of 589 kg ha⁻¹ [2]. Seed being the basic input in agriculture, production and supply of quality seeds to the farmers will go a long way to achieve the goal of self sufficiency in this oilseed crop. Seed treatment with chemicals are commonly used to ensure uniform stand establishment by improving germination and vigour and protecting against soil borne pathogens and insects [3]. Commonly synthetic fungicides, even though effective, they cause problems of residue retention and non-biodegradability [4]. Medicinal plants are nature's wonderful gift and used widely in traditional systems like

Ayurveda, Siddha and Unani [5]. Usage of medicinal plants and plant derived compounds in treatment and also in preventing diseases in animals and plants is a common practice [6]. *Cichorium intybus*, also known by the name chicory (family: Asteraceae) is grown in most of the Asian countries [7]. This plant is highly medicinal and are widely used in traditional as well as modern medicine [8]. Hence the present study, aqueous leaf extract of chicory herbal plant were evaluated for their potency in resultant seed quality parameters in sesame.

MATERIALS AND METHODS

The present study was carried using genetically pure seeds of sesame (*Sesamum indicum L.*) cv. TMV 3 obtained from the Oilseed Research Station, Thindivanam, Tamilnadu. The experiments were conducted at the Department of Genetics and Plant Breeding, Faculty of Agriculture, Annamalai University, Annamalai Nagar (11°24'N latitude and 79°44'E longitude with an altitude of +5.79 mts above mean sea level). The bulk seeds were graded for uniformity using appropriate round perforated metal sieves of sizes of 5/64". The chicory herbal leaf extract pre sowing treatment @ 20% were treated commonly as presowing seed treatment and also used as foliar spray at three concentrations viz., 10.0, 20.0 and 30.0 % to assess the ameliorative effect under rainfed condition.

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Treatment detailsT₀-ControlT₁-Chicory @ 20 % Pre sowing seed treatment.T₂-Chicory @ 20 % seed hardening treatment+without foliar spray at stress during vegetative stageT₃-Chicory @ 20 % seed hardening treatment+Chicory foliar spray @ 10 % during vegetative stageT₄-Chicory @ 20 % seed hardening treatment+Chicory foliar spray @ 20 % during vegetative stageT₅-Chicory @ 20 % seed hardening treatment+Chicory foliar spray @ 30 % during vegetative stageT₆-Chicory @ 20 % seed hardening treatment+without foliar spray during flowering stageT₇-Chicory @ 20 % seed hardening treatment+Chicory foliar spray @ 10 % during flowering stageT₈-Chicory @ 20 % seed hardening treatment+Chicory foliar spray @ 20 % during flowering stageT₉-Chicory @ 20 % seed hardening treatment+Chicory foliar spray @ 30 % during flowering stageT₁₀-Chicory @ 20 % seed hardening treatment+without foliar spray during pod filling stageT₁₁-Chicory @ 20 % seed hardening treatment+Chicory foliar spray @ 10% during pod filling stageT₁₂-Chicory @ 20 % seed hardening treatment+Chicory foliar spray @ 20 % during pod filling stageT₁₃-Chicory @ 20 % seed hardening treatment+Chicory foliar spray @ 30 % during pod filling stageT₁₄-Foliar spray with Brassinolide at all stages of stress+with out foliar spray.

The above treatments were tested for production potential under rainfed condition. The experimental plots were executed with 4m x 4m and the seeds were line sowed and

maintained with a spacing of 30 cm between rows and within a row. The crop was thinned after one week. Normal agronomic package of practices were followed. The experiments were carried out in randomized block design with three replications. From each treatment, 10 plants were selected and the seeds were harvested from the above treatments. The resultant seed characters i.e., germination percentage, shoot length, root length, dry matter production were estimated following the procedure of ISTA, [9], vigour index by Abdul-Baki and Anderson, [10] speed of germination [11], EC [12], catalase activity and peroxidase as per Malik and Singh [13] were recorded. The data were statistically analyzed as per the method of Panse and Sukhatme [14].

RESULTS AND DISCUSSION

Establishment of a good seedling stand in the field is an important and foremost need for higher crop yield. This depends largely on the field germination and vigour potential of the seeds used for sowing. The results presented in table 1 and 2 revealed that the Chicory @ 20 % Pre sowing seed treatment+Chicory foliar spray @ 30 % during pod filling stage improved the resultant seed quality characteristics. In the present study, T₁₃ treatment recorded the higher germination percentage (98 %), lengthier root (19.9 cm), lengthier shoot (19.7 cm), higher dry matter production (387 mg) and vigour index (3880), when compared to control and other treatments. The control treatment recorded only lower germination (77 %), root length (15.9 cm), shoot length (12.3 cm), dry matter production (251 mg) and vigour index 2171 (table 1). The probable reason may be the presence of tannins and Saponins in the chicory leaf extract, which are the high molecular weight polyphenolic compounds and are efficient antioxidants [15]. This invigourative effect might have rectified the causes of low vigour and improved the seed and seedling characteristics [16]. They are effective free radical scavengers and protect the cell membrane [17]. The above results are in conformity with the previous reports [18-20].

Table 1: Effect of chicory leaf extract seed hardening treatment cum foliar spray on resultant seed quality characters of sesame cv TMV 3

Treatments	Germination percentage (%)	Shoot length (cm)	Root length (cm)	Dry matter production (mg. 10 seedlings ⁻¹)	Vigour index (VI)
T ₀	77 (59.02)	12.3	15.9	251	2171
T ₁	80 (60.03)	13.7	16.1	264	2884
T ₂	80 (60.03)	14.2	16.1	281	2424
T ₃	82 (61.36)	15.3	16.5	297	2607
T ₄	83 (64.03)	16.4	16.7	311	2747
T ₅	85 (66.01)	17.6	17.0	327	2941
T ₆	86 (66.14)	17.5	17.1	320	2975
T ₇	87 (67.14)	18.2	17.5	332	3105
T ₈	88 (69.03)	18.1	17.7	341	3150
T ₉	90 (70.62)	18.5	18.3	344	3312
T ₁₀	91 (72.11)	18.2	18.5	346	3339
T ₁₁	92 (73.21)	18.6	18.7	351	3431
T ₁₂	94 (76.12)	19.1	19.1	358	3590
T ₁₃	98 (87.21)	19.9	19.7	387	3880
T ₁₄	94 (76.12)	19.4	19.3	361	3637
MEAN	87 (66.34)	17.1	17.6	323	3088
CD(0.05 %)	3.21	1.13	0.577	21.27	48.37

fig. in parenthesis are arcsine transformed value

Table 2: Effect of chicory leaf extract seed hardening treatment cum foliar spray on resultant seed quality characters of sesame cv TMV 3

Treatments	Speed of germination	Electrical conductivity (dSm ⁻¹)	Catalase activity (Units/g tissue)	Peroxidase activity (Unit/l)
T ₀	7.85	0.297	2.075	2.46
T ₁	8.11	0.291	2.232	2.65
T ₂	8.56	0.284	2.532	2.81
T ₃	9.17	0.276	2.814	2.92
T ₄	9.62	0.267	2.978	3.06
T ₅	10.57	0.251	3.118	3.18
T ₆	10.95	0.237	3.214	3.32
T ₇	11.24	0.211	3.324	3.46
T ₈	11.56	0.196	3.412	3.51
T ₉	12.11	0.181	3.482	3.58
T ₁₀	12.84	0.164	3.507	3.68
T ₁₁	12.75	0.156	3.542	3.73
T ₁₂	13.14	0.138	3.661	3.78
T ₁₃	13.99	0.124	3.999	3.84
T ₁₄	13.31	0.127	3.869	3.87
MEAN	11.05	0.213	3.176	3.33
CD(0.05 %)	0.438	0.031	0.221	0.25

In the present study, T₁₃ treatment recorded the higher speed of germination (96 %), low EC (0.124 dSm⁻¹), higher catalase activity (3.999 unit/g tissue) and higher peroxidase (3.84 Unit/l), when compared to control and other treatments. The control treatment recorded only lowest speed of germination (7.85), high EC (0.297 dSm⁻¹), lowest catalase activity (2.075 unit/g tissue) and peroxidase (2.46 Unit/l) (table 2). The probable reason might be the leaf extract of chicory having various phytochemical components i.e., tannins, saponins, flavonoids, terpenoids, which are non nutritive compounds and play an important role in various functions of growth, thereby improving oxidative process of important macromolecules such as lipids, proteins and nucleic acids [18]. It would have triggered the germination process earlier thereby utilizing the available nutrients. The lowering of electrical conductivity in T₁₃ seeds implies the operation of repair mechanism brought on by chicory leaf extract effect. It is possible that phosphorous along with other minerals and vitamin C present in chicory leaf extracts would have helped for substitution of scavenging properties to bring down peroxidase changes ultimately maintaining vigour and viability at a higher level [19]. This beneficial effects of chicory leaf extract may be attributed not only to cellular repair but also to the control of free radical reaction. The above results are in conformity with the reports of Vanitha *et al.* [19] in maize and Vanitha *et al.* [21] in sunflower, Sathiya Narayanan *et al.* [20] in sesame. The results revealed that the Chicory @ 20 % Pre sowing seed treatment+Chicory foliar spray @ 30 % during pod filling stage significantly increased the resultant seed quality characters of the sesame, when compared to other concentration treatments and control.

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