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Full length Research paper

Influence of different priming treatments on emergence and seedling growth of jeera

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The present investigation was carried out at seed testing Laboratory of the Department of Genetics and Plant Breeding, Sam Higginbottom University of Agriculture, Technology & Science Allahabad, Uttar Pradesh during Rabi 2020-2021. The experiment laid out in a Completely Randomized Design. Jeera seeds (Variety) was subjected to various various pre sowing treatments like GA_3, PEG(6000), Salicylic acid, IAA, mancozeb, thiram, Nacl, Cacl2, Kno3, Curry leaf extract, neem leaf extract, ginger extract at various concentrations along with distilled water control.The laboratory data collected for various parameters germination percentage, root length, shoot length, seedling length, seedling fresh weight, seedling dry weight, seed vigour index I, seed vigour index II.The study revealed that jeera seeds primed with (GA_3 50 ppm) showed maximum germination percent of (93.09), root length (7.23cm), shoot length (9.45cm), seedling length (16.68cm), seedling fresh weight (4.51g), seedling dry weight (0.49g), vigour index I (1552.41), vigour index II (45.99) increased. $GA_3$was found to be the best seed treatment for seedling characteristics of both Jeera seeds followed by (Mancozeb 2g/kg), (Ginger extract 3%).

Key words: Jeera seeds, Salicylic acid, ginger extract, mancozeb, thiram, Curry leaf extract.

INTRODUCTION

Cumin commonly known as Jeera (*Cuminum cyminum L.*) is grown extensively in Rajasthan, Gujarat and Haryana during rabi season and together accounts for over 85% of the total production of cumin seed, out of which Rajasthan state alone contribute around 52% of the total national production (Mahajan *et al*., 2013). It covers and contribute 1.7 lakh ha area and 29365 tons production in the state respectively (Rowniyar *et al*., 2021).Cumin seeds and oils are used in culinary preparations for flavouring vegetable, pickles, soup, sauces, cheese and seasoning of breads, cakes and biscuits (Lim et al.,2013). It is also valued for its typical pleasant aroma from its volatile or essential oil (2.3 to 4.8%) (Mahajan *et al*., 2013). Apart from its culinary value, cumin is also extensively used in ayurvedic medicines.

In India, cumin seed is a rabi crop sown in october - november and harvested in february. cumin is grown from seed. A hot climate is preferred, but it can be grown in cooler regions if started under glass in spring. A sandy soil is best; when the seedlings have hardened, transplant carefully to a sunny aspect, planting out 15cm (6 in) apart.

Cut the plants when the seeds turn to brown, thresh and dry like the other Umbelliferae (Sharifi *et al.,* 2021).

The impact of PGRs in manipulating physiological processes in crop production include germination, vigour, nutrient uptake from soil, photosynthesis, respiration, partitioning of assimilate, growth suppression, defoliation and post-harvest ripening (Sivakumar *et al.,* 2005).

The role of salicylic acid in enzymatic activity and in abiotic stress tolerance such as heat, and osmotic stress (Khan et al., 2018) has been reported. Studies on Vigna radiata have shown that salicylic acid could be used as a potential growth regulator to improve salinity stress (Hegazi *et al*., 2007).

OBJECTIVES

To study was undertaken to study the influence of priming on emergence and seedling growth of jeera.

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To find out suitable treatment of jeera crop.

MATERIALS AND METHODS

The experiment were be laid out in completely Randomized Design with 13 treatments and 4 replications.
Jeera seeds (Variety) are subjected to various various pre sowing treatments like GA_3, PEG(6000), salicylic acid, IAA, mancozeb, thiram, Nacl, Cacl2, Kno3, Curry leaf extract, neem leaf extract, Ginger extract at various concentrations along with distilled water control.

After completion of pre-sowing treatments hundred seeds of each treatment were placed for germination in four replications in completely randomized design (CRD).The between paper methods used for samples and placed them in germination chamber at 25˚C temperature. The laboratory data collected for germination percentage, root length, shoot length, seedling length, seedling fresh weight, seedling dry weight, seed vigour index I, seed vigour index II.

RESULTS AND DISCUSSION

All the treatments were significantly differ from each other.

Effect of priming on germination percent

The maximum germination percent (93.09) was recorded with (T1) GA3 50 ppm followed by (T5) mancozeb 2gm/kg (90.70) and (T12) Ginger extract 3% (90.59) were found at par.Whereas minimum germination percent recorded in (control)T0 (79.78).This experiment provided information about germination percent will be increased when it will be treated with GA3 50 ppm of jeera seed than other treatments.This results showed similar findings of Mishra *et al.,* (2021), Keikha *et al.,* (2017), Dmytruk *et al.,* (2016).

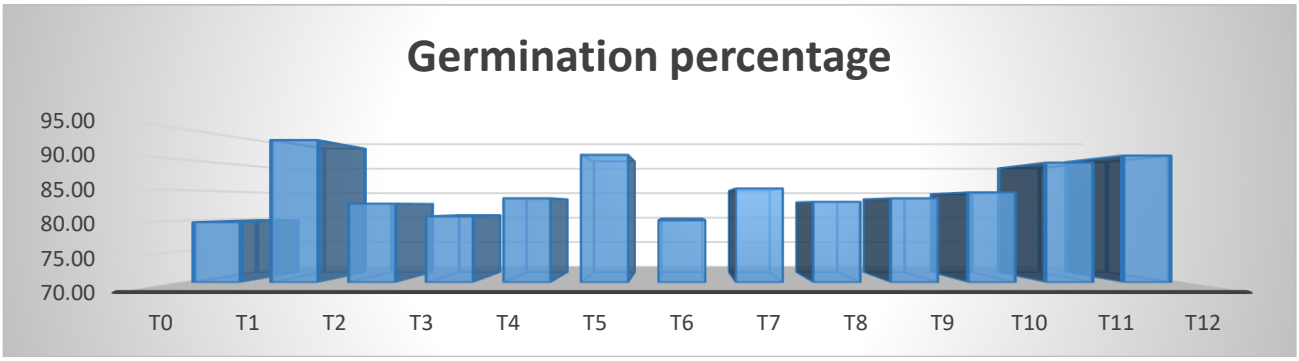

Figure1: Germination % as influence by different priming treatments on jeera seeds

Effect of priming on root length

The maximum amount of root length (7.23) recorded with T1 (GA3 50 ppm) followed by (T5) mancozeb 2gm/kg (7.16) and (T12) Ginger extract 3% (7.05) were found at par. Whereas minimum root length (5.62) recorded with (control). This experiment provided information about root length will be increased when it will be treated with GA3 50 ppm of jeera seed than other treatments. This results showed similar findings of Ahmad *et al.,* (2021), Shruthi *et al.,* (2018), Ma *et al.,* (2018**).**

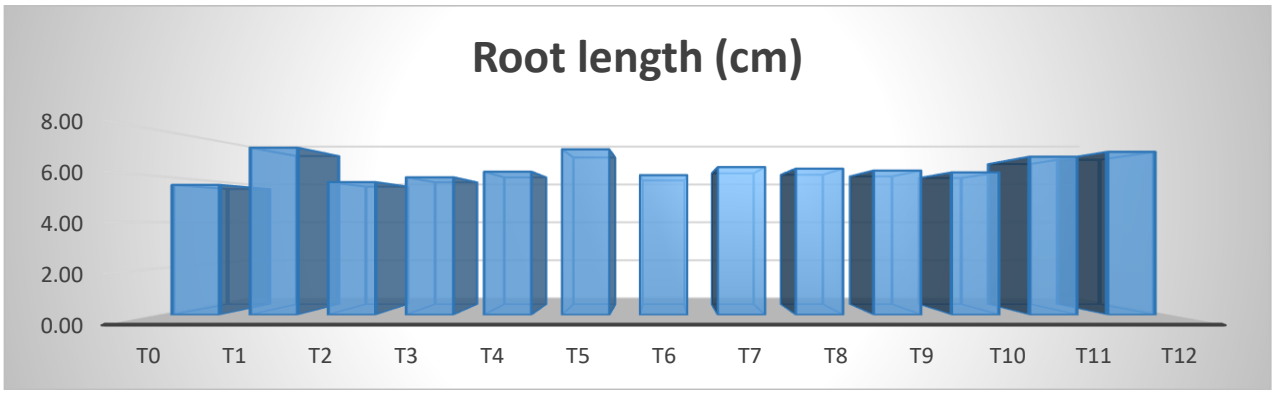

Figure2a: Root length as influence by different priming treatments on jeera seeds

Effect of priming on shoot length

The maximum shoot length (9.45) was recorded with T1 (GA3 50 ppm) followed by (T5) mancozeb 2gm/kg (9.38) and (T12) Ginger extract 3% (9.27) were found at par. Whereas minimum shoot length (7.96) recorded with T0 (control). This experiment provided information about shoot length will be increased when it will be treated with GA3 50 ppm of jeera seed than other treatments. This results showed similar findings Rafique *et al*., (2021), Tsegay *et al*., (2018), Sisodia *et al.,* (2018).

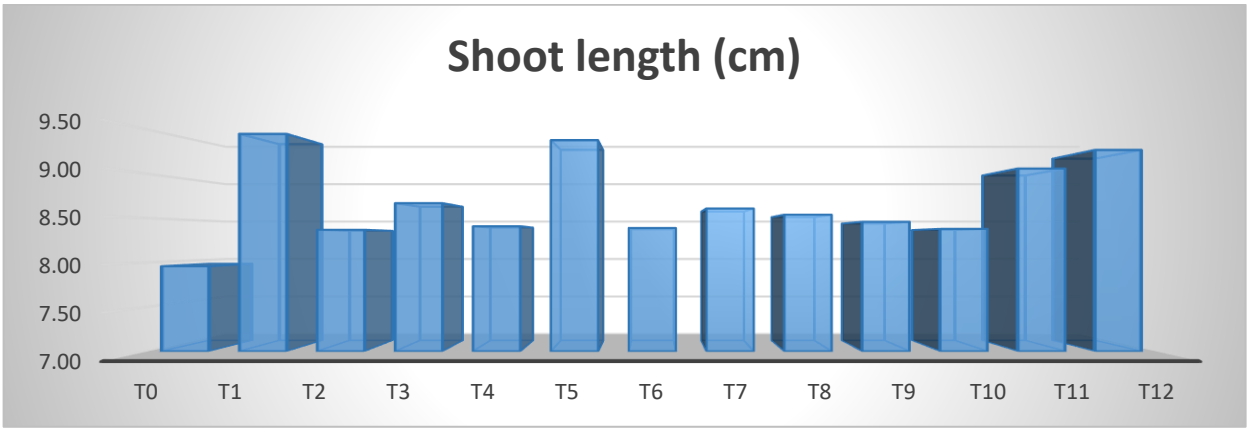

Figure 3a: Shoot length as influence by different priming treatments on jeera seeds

Effect of priming on seedling length

The maximum seedling length (16.68) was recorded with T1 (GA_3 50 ppm) followed by (T5) mancozeb 2gm/kg (16.54) and (T12) Ginger extract 3% (16.32) were found at par. Whereas minimum seedling length (13.58) recorded with T0 (control). This experiment provided information about seedling length will be increased when it will be treated withGA_3 50 ppm of jeera seed than other treatments. This results showed similar findings Afzal *et al*., (2020), Sarika *et al.,* (2013), LI *et al.,* (2010).

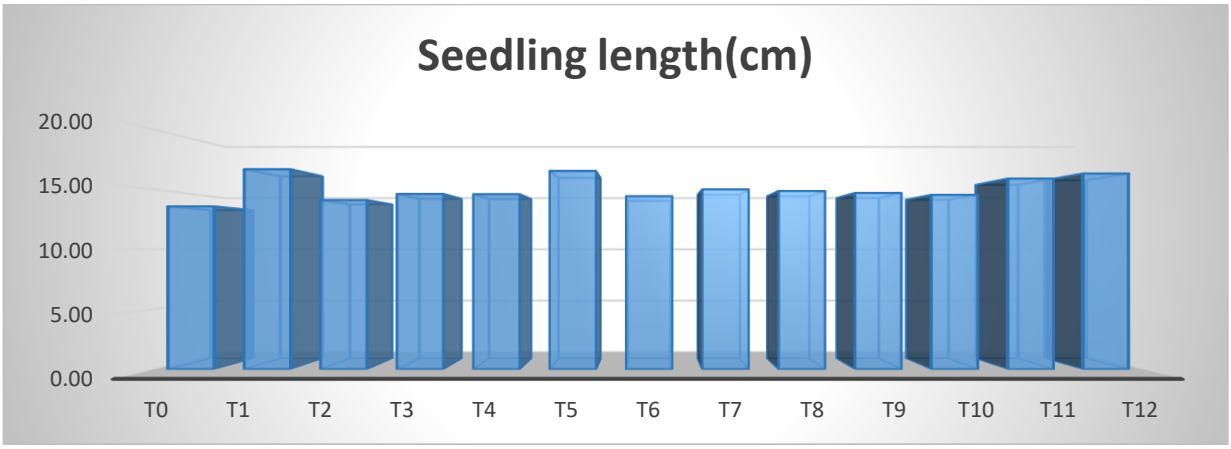

Figure 4a: Seedling length as influence by different priming treatments on jeera seeds

Effect of priming on seedling fresh weight

The maximum seedling fresh weight (4.51) was recorded with T1 (GA3 50 ppm) followed by (T5) mancozeb 2gm/kg (4.44) and (T12) Ginger extract 3% (4.33) were found at par. Whereas minimum seedling fresh weight (2.71) recorded with T0 (control). This experiment provided information about seedling fresh weight will be increased when it will be treated with GA3 50 ppm of jeera seed than other treatments. This results showed similar findings of Thejeshwini *et al.*, (2019), Sajjan *et al.,* (2017), Afzl*et al*., (2008).

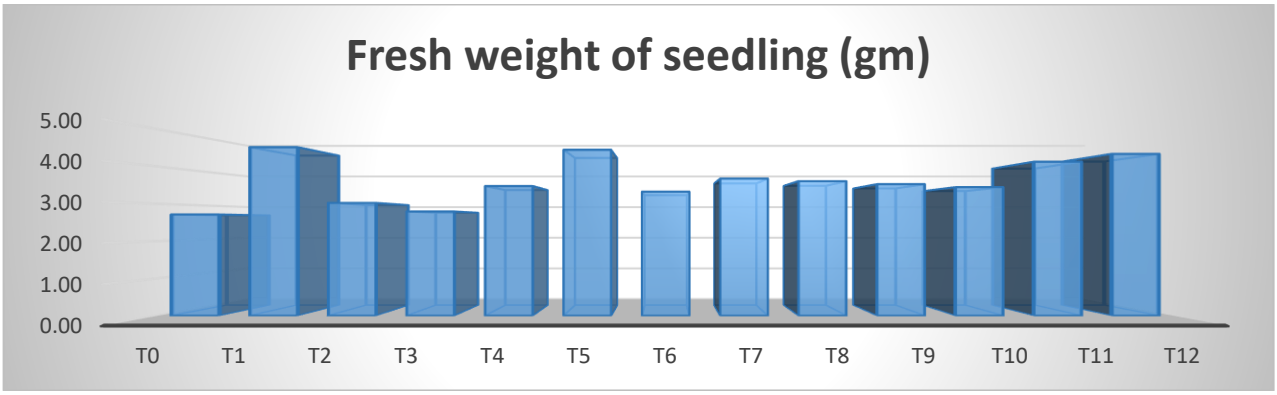

Figure 5a: Seedling fresh weight as influence by different priming treatments on jeera seeds

Effect of priming on seedling dry weight

The maximum seedling dry weight (0.49) was recorded with T1 (GA3 50 ppm) followed by (T5) mancozeb 2gm/kg (0.64) and (T12) Ginger extract 3% (0.87) were found at par. Whereas minimum seedling dry weight (0.33) recorded with T0 (control). This experiment provided information about seedling dry weight will be increased when it will be treated with GA3 50 ppm of jeera seed than other treatments. This results showed similar findings of Arun *et al*., (2017), Rogis*et al.,* (2004), Sarkar *et al.,* (2002).

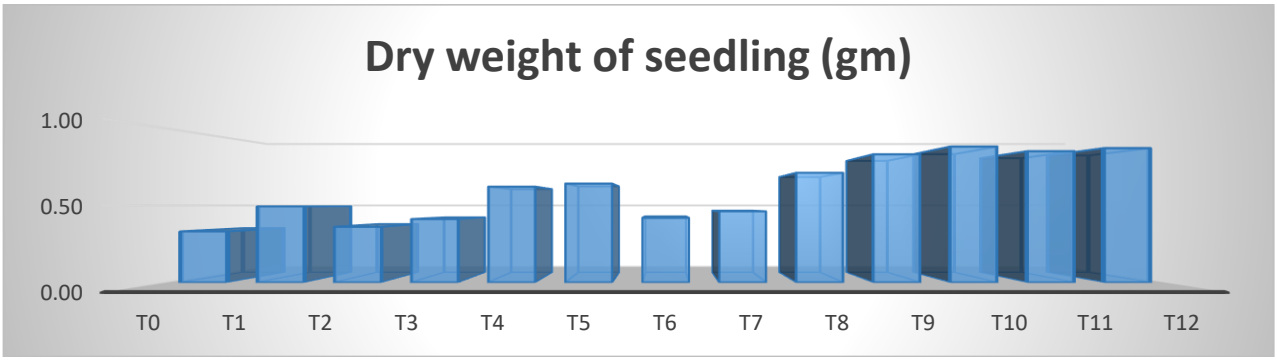

Figure 6a: Seedling dry weight as influence by different priming treatments on jeera seeds

Effect of priming on seed vigour index I

The maximum seed vigour index I (1552.41)was recorded with T1 (GA3 50 ppm) followed by (T5) mancozeb 2gm/kg (1449.86) and (T12) Ginger extract 3% (1478.11) were found at par. Whereas minimum seed vigour index I (1083.13) recorded with T0 (control). This experiment provided information about seed vigour index I will be increased when it will be treated with GA3 50 ppm of jeera seed than other treatments. This results showed similar findings of Sisodia *et al.,* (2018), Rajala *et al*., (2001), Kang *et al*., (2000).

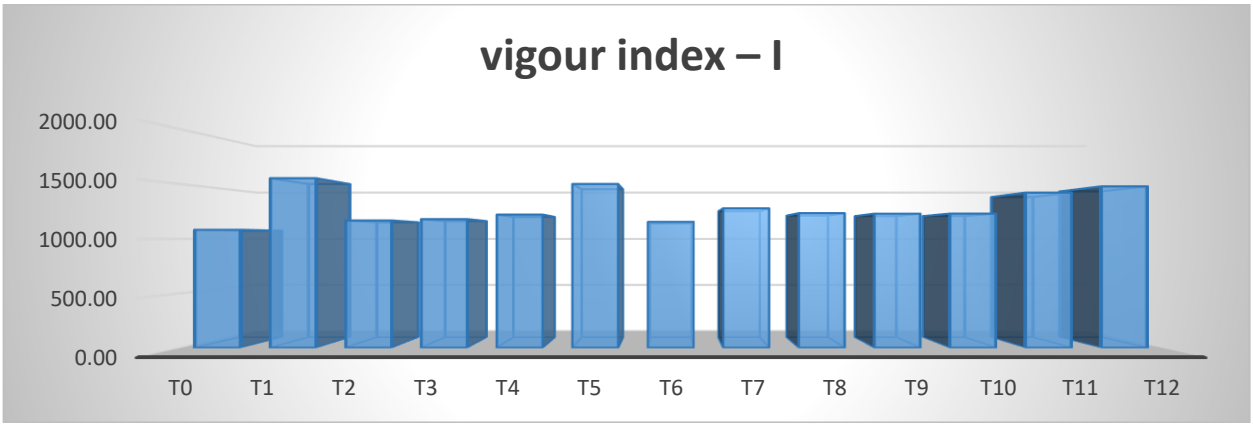

Figure 7a: Seed vigour index I as influence by different priming treatments on jeera seeds

Effect of priming on seed vigour index II

The maximum amount of seed vigour index II (45.99) recorded with T1 (GA3 50 ppm) followed by (T5) mancozeb 2gm/kg (58.19) and (T12) Ginger extract 3% (78.95) were found at par. Whereas minimum seed vigour index II (26.45) recorded with T0 (control). This experiment provided information about seed vigour index II will be increased when it will be treated with GA3 50 ppm of jeera seed than other treatments. This results showed similar findings of Tsegay *et al*., (2018), LI *et al.,* (2010), Sarika *et al.,* (2013).

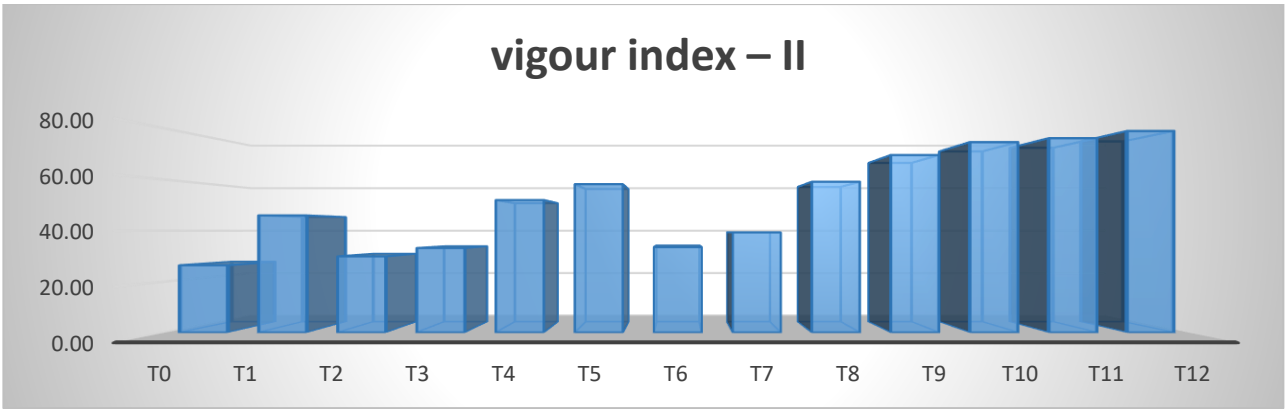

Figure 8a: Seed vigour index II as influence by different priming treatments on jeera seeds

CONCLUSION

The study reveals that jeera seeds primed with T1 (GA_3 50 ppm) germination % (93.09), root length (7.23cm), shoot length (9.45cm), seedling length (16.68cm), seedling fresh weight (4.51g), seedling dry weight (0.49g), vigour index I (1552.41), vigour index II (45.99) increased. GA_3showed better performance on Jeera seeds followed by T5 (Mancozeb 2g/kg), T12 (Ginger extract 3%). GA_3 50 ppm contributing to enhance all the seedling growth parameterswhereas minimum observed in T0 control.

ACKNOWLEDGEMENTS

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Table.1 Mean performance of lab parameters for Jeera

Treatments	Chemicals	Concentration	Germination percentage	Root length (cm)	Shoot length (cm)	Seedling length(cm)	Fresh weight of seedling (gm)	Dry weight of seedling (gm)	Seed vigour index – I	Seed vigour index – II
T_0	-	-	79.78	5.62	7.96	13.58	2.71	0.33	1083	26.45
T_1	GA3	50ppm	93.09	7.23	9.45	16.68	4.51	0.49	1552	45.99
T_2	PEG(6000)	75ppm	82.79	5.74	8.37	14.11	3.02	0.36	1167	29.93
T_3	Salicylic acid	100ppm	80.71	5.95	8.67	14.62	2.79	0.41	1179	33.21
T_4	IAA	50ppm	83.66	6.19	8.41	14.60	3.47	0.62	1221	52.00
T_5	Mancozeb	2gm/kg	90.70	7.16	9.38	16.54	4.44	0.64	1499	58.19
T_6	Thiram	3gm/kg	80.07	6.04	8.39	14.43	3.32	0.42	1155	33.55
T_7	Nacl	2gm/kg	85.24	6.39	8.61	15.00	3.67	0.46	1278	39.34
T_8	$Cacl_2$	3gm/kg	83.09	6.32	8.54	14.86	3.60	0.71	1234	59.12
T_9	Kno_3	3gm/kg	83.66	6.24	8.46	14.70	3.52	0.83	1229	69.57
T_{10}	Curry leaf extract	3%	84.62	6.16	8.38	14.54	3.44	0.88	1230	74.59
T_{11}	Neem leaf extract	5%	89.43	6.84	9.06	15.90	4.12	0.85	1421	76.15
T_{12}	Ginger extract	3%	90.59	7.05	9.27	16.32	4.33	0.87	1478	78.95
		MEAN	**85.19**	**6.38**	**8.69**	**15.06**	**3.61**	**0.61**	**1287.02**	**52.08**
	Range	**MIN**	**79.78**	**5.62**	**7.96**	**13.58**	**2.71**	**0.33**	**1083.13**	**26.45**
		MAX	**93.09**	**7.23**	**9.45**	**16.68**	**4.51**	**0.88**	**1552.41**	**78.95**
		CV	**3.05**	**4.15**	**2.26**	**4.59**	**4.21**	**2.29**	**7.66**	**5.36**
		SED	**2.07**	**1.06**	**1.22**	**1.39**	**0.56**	**0.23**	**3.76**	**2.40**
		CD at 5%	**4.52**	**2.31**	**2.66**	**3.03**	**1.22**	**0.50**	**8.20**	**5.23**
		CD at 1%	**5.62**	**2.87**	**3.30**	**3.76**	**1.52**	**0.62**	**10.19**	**6.50**

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