

1 “Effect of seed priming on seed quality attributes in chickpea (*Cicer arietinum* L.)”
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4

5 **Abstract**

6 Effect of seed priming on seed quality attributes in chickpea (*Cicer arietinum* L.), one varieties
7 Field and Laboratory experiment (G₂-315) with 10 treatments (incomplete sentence). Viz T1-
8 Tulsi leaf extract @ 1 % (12hours). T2 - Tulsi leaf extract @ 3% (12hours). T3 Tulsi leaf extract
9 @5% (12hours). T4 Neem seed extract 1% (12hours), T5- Neem seed extract @ 3% (12hours),
10 T6- Neem seed extract @ 5% (12hours), T7- KNO₃ @ 1% (12 hours). T8 - KNO₃ @ 3% (12
11 hours). T9 - KNO₃ @ 5% (12hours). T10- Control. In all treatment the seeds of chickpea were
12 soaked for 12 hours and dried for 2 hours except control (untreated seeds) (these data should be
13 in material and methods section). It was found that all the priming treatments showed
14 significance difference with the control while highest plant height, number of primary branches
15 per plant germination percentage (meaning?). Days to 50% flowering. Number of siliqua per
16 plant. Number of seeds per siliqua, seed weight (gm), and seed quality parameters viz,
17 Germination percentage(%), Root length (cm), Shoot length (cm), Seedling length (cm).
18 Seedling fresh weight (gm). Seedling dry weight (gm), Vigour index-I, Vigour index -II.
19 electrical conductivity were observed for seeds treated with T₉-KNO₃@ 5% followed by T₃-Tulsi
20 Leaf Extract @ 5%, while the lowest was observed in T₁₀-Control. The study helps to study field
21 and seed quality parameters with the help of seed priming treatments which are effective,
22 economic, non-toxic and eco-friendly sources.
23

24 Keywords: G₂-315, Chickpea. Seed priming

25 **Introduction**

26 Pulses improve soil structure and fix atmospheric nitrogen, preserving soil fertility. Pulses are
27 regarded as an excellent crop for the management of natural resources, environmental crop
28 diversification, and consequently for sustainable agriculture because they play a significant role
29 in improving the physical, chemical, and biological properties of soils in rain fed agriculture
30 (Khan *et al.*, 2006).India's trade, production, and consumption of pulses. Leguminaceae, or
31 chickpea (*Cicer arietinum* L.), has a 2n=16 genetic makeup. The name *Cicer* is a translation of
32 the Greek word *kiros*, which refers to the famous Roman family *Cicero*. The Latin word
33 *arietinum*, which means "ram," refers to the chickpea's ram-like head shape. It also goes by the
34 name *Bengal gramme*. It is a cool-season legume crop that is grown as a food crop in many
35 nations around the world. (you need references)

36 Chickpea contains protein (22-28 %), fat (4.8-5.5 %), carbohydrates (40-65 %), ash (48
37 %),moisture(4.9-15.59),vitalvitaminslikevitaminA, vitaminB1,B2andB3,vitaminc, vitamin E
38 vitamin K,FolateandPantoemicacid(ZoharyandHopf,2000). Additionally, chickpeas contain a
39 variety of vital minerals, including calcium, iron, molybdenum, potassium, manganese, copper,
40 and zinc. Additionally, chickpeas contain dietary fibre, water, and other nutrients (references).
41 Generally improving germination rate and plant performance, seed priming is a pre-sowing
42 technique for influencing seedling development by modifying pre-germination metabolic activity
43 before the radicle emerges (Bradford, 1986). The primary goals of the investigation are to
44 evaluate the impact of various priming techniques on the development, yield, and defining

45 characteristics of chickpeas, as well as to identify the most effective priming technique for this
46 crop. Perhaps the osmotic potential and chemical makeup of the salt species used have an impact
47 on how effective priming with simple salt solution is (sentence need improvement). It has been
48 suggested that compounds containing nitrate may act as priming agents more effectively than
49 other salts. Numerous salts have been found to work very well as primers.

50 **Materials and Methods:**

51 The field experiment was carried out at the crop research centre of department of Genetics and
52 Plant Breeding, ITM University, Gwalior, Madhya Pradesh, India, geographically located at
53 26.22°N, 78.18°E and at an average elevation of about 197m above the mean sea level. The
54 experimental research material was collected from local farmer from Maharashtra, the pure seeds
55 of chickpea variety G₂-315. The seeds of the varieties G₂-315 were primed for 12 hours with
56 various doses of Tulsi leaf extract, Neem seed extract, and KNO₃ leaf extract, then dried to their
57 original moisture content according to the treatment. Foliar applications of various chemicals
58 were given at the bud initiation stage and 8 days after bud initiation. Details of the treatments are
59 mentioned below.

60 The treatments used at different concentrations viz.,

- 61 T1 - Tulsi leaf extract @ 1%
- 62 T2 - Tulsi leaf extract @ 3%
- 63 T3 - Tulsi leaf extract @ 5%
- 64 T4 - Neem seed extract @ 1%
- 65 T5 - Neem seed extract @ 3%
- 66 T6 - Neem seed extract @ 5%
- 67 T7 - KNO₃ leaf extract @ 1%
- 68 T8 - KNO₃ leaf extract @ 3%
- 69 T9 - KNO₃ leaf extract @ 5%
- 70 T₁₀ - Unprimed Control

71 **Scientific name and varieties of used plant (Tulsi, Neem)**

72 After cleaning and grading, these seeds were soaked in respective priming solutions at different volume of
73 seeds for twelve hours. Then the seeds were air dried under the
74 shade to bring back to their original moisture content and used for sowing

75 **Leaf extract method? Solvent? Reference of methods?**

76

77 **Field observations:**

78

- 79 1. Days to 50 percent Flowering: definition
- 80 2. Plant height at maturity (cm): meaning of maturity?
- 81 3. Number of primary branches per plant:
- 82 4. Pod per plot : ?
- 83 5. Seed yield per pod (g): meaning?
- 84 6. 100 seed weight (g)

85 **Laboratory observation:**

- 86 7. Germination percentage (%)
- 87 8. Shoot length (cm):
- 88 9. Root length (cm):

- 89 10. Seedling length (cm):
 90 11. Seedling fresh weight (SFW):
 91 12. Seedling dry weight (SDW):
 92 13. Seedling vigour Index I: definition and formula
 93 14. Seedling Vigour Index II: definition and formula
 94 15. Electrical conductivity (ds/m): definition and method

96
 97 **Results and Discussion:**

98 A field experiment was conducted to study the effect of seed priming on the growth, yield,
 99 field attributes and seedling parameters
 100 on Desi Chickpea (*Cicer arietinum* L.) areas follows. The experiment was carried out during Rabi
 101 season 2021-2022, Department of Genetics and Plant Breeding, School of Agriculture, ITM
 102 University, Gwalior. The results are given and discussed under following headings.

103 Analysis of variance
 104 Mean performance

105
 106 **Analysis of variance:**

107 The analysis of variance for growth and seed yield characters was presented in Table 1. Analysis
 108 of variance revealed that the differences among thirteen treatments were significant for growth
 109 and yield, viz., field emergence percentage, Plant Height at Maturity, Primary Branches, Days to
 110 50% Flowering, Pods per Plant, Seeds per Pod, Plot Yield (g), 100 Seed Weight (g), Seed
 111 Germination Percentage (%), Fresh Weight of Seedling, Dry Weight of Seedling (g), Shoot
 112 Length, Root Length, Seedling Length, Vigour index 1, Vigour index 2, Electrical conductivity.

113
 114 **Table :1 Analysis of Variance for 16 Characters in Chickpea**
 115 **Incomplete title**

S.No	Characters V1(G2 -315)	Mean sum of squares		
		Replications (DF=2)	Treatments (DF=9)	Error (DF=18)
1	Plant Height at Maturity	27.140	199.541**	4.282
2	Primary Branches	0.261	1.308	0.146
3	Days to 50% Flowering	1.43	327.73	7.69
4	Pods per Plant	43.90	456.922	22.678
5	Seeds per Pod	0.0025	0.292	0.014
6	Plot Yield (g)	3.0	24815.66	52.227
7	100 Seed Weight (g)	3.1930	18.80	0.108
8	Seed Germination Percentage (%)	0.354	88.486	1.443
9	Fresh Weight of Seedling	0.4459	2.0839	0.008
10	Dry Weight of Seedling (g)	0.0228	0.2639	0.008
11	Shoot Length	0.436	10.069	0.208
12	Root Length	0.012	0.17866	0.0074
13	Seedling Length	0.508	12.77	0.1936

14	Vigour index 1	4857	199412	2350
15	Vigour index 2	168.2	3616.2	77.4
16	Electrical conductivity	0.03033	1.04922	0.03700

117 ** 5% significant level

118
119 **2. Mean performance:**

120
121 **Effect of different priming methods on field emergence percent:**

122
123 **1 Days to 50% flowering:**

124 The data regarding Days to 50% Flowering (parameter need more explanation) as influenced by
125 different seed priming treatments was shown in the Table –.2

126 The mean performance of days to 50% flowering variety G2-315 ranged from T₉ KNO₃ 5%
127 (69.66) to T₄ Neem seed extract 1% (94.00) with mean value of 84.03. Significantly taken
128 highest days to 50% flowering (99.00) was reported in T₁₀ with control and it was followed by T₄
129 Neem seed extract 1% (94.00) ,T₅ Neem seed extract 3% (92.00),T₆ Neem seed extract 5%
130 (89.00,) T₁tulsi leaf extract 1% (88.66) .Minimum days to 50% flowering was recorded by T₉
131 KNO₃ 5% (72.00).The present findings are in confirmation with the results of Nelakurthi
132 Venkata Praveen *et al.*, (2020) G. Abdul Wajid *et al.*, (2021) Deepak Chand Bhatshwara *et al.*,
133 (2020)

134 **2 Plant height at maturity (cm):**

135 The mean performance of plant height at maturity in variety G2-315 ranged from T₄ Neem seed
136 extract 1% (54.00) to T₉ KNO₃ 5% (72.06) with mean value of 59.80. Significantly taken highest
137 plant height at maturity flowering (72.06) was reported in T₉ KNO₃ 5% and it was followed by
138 T₃tulsi leaf extract 3% (68.50) T₈ KNO₃ 3% (64.56) , T₂tulsi leaf extract 3% (59.63), T₁tulsi leaf
139 extract 1% (58.13) .Minimum plant height at maturity was recorded by T₁₀ with control (43.30).
140 Similar result was observed by Kalyanrao Patil *et al.*, (2018) Nelakurthi Venkata Praveen *et al.*,
141 (2020) Deepak Chand Bhatshwara *et al.*, (2020) G. Abdul Wajid *et al.*, (2021)

142 **3 Number of primary branches per plant:**

143 The mean performance of Number of primary branches per plant in variety G2-315 ranged from
144 T₄ Neem seed extract 1% (2.03) to T₉ KNO₃ 5% (3.66) with mean value of 2.78. Significantly
145 taken highest primary branches per plant flowering (3.66) was reported in T₉ KNO₃ 5% and it
146 was followed by T₈ KNO₃ 3% (3.50) T₇ KNO₃ 1% (3.33) , T₃tulsi leaf extract 5% (3.13), T₁tulsi
147 leaf extract 3% (3.00) .Minimum Number of primary branches per plant was recorded by T₁₀
148 with control (1.66). Similar result was observed by Nelakurthi Venkata Praveen *et al.*, (2020) G.
149 Abdul Wajid *et al.*, (2021) Deepak Chand Bhatshwara *et al.*, (2020) Bethalakumeera *et al.*, (2018)

150 **4. Number of pods per plant:**

151 The mean performance of Number of Pods per plant in variety G2-315 ranged from T₄ Neem
152 seed extract 1% (103.00) to T₉ KNO₃ 5% (134.33) with mean value of 117.70. Significantly
153 taken highest pods per plant flowering (134.33) was reported in T₉ KNO₃ 5% and it was
154 followed by T₃tulsi leaf extract 5% (133.00), T₇ KNO₃ 1% (126.33) T₈ KNO₃ 3% (125.66) ,
155 T₂tulsi leaf extract 3% (119.33) .Minimum Number of pods per plant was recorded by T₁₀ with
156 control (97.66). Similar result was observed by Nelakurthi Venkata Praveen *et al.*, (2020)
157 Deepak Chand Bhatshwara *et al.*, (2020) Sampathi Sowjanya *et al.*, (2020) G. Abdul Wajid *et*
158 *al.*, (2021)

160 **5. Number of seeds per pod:**

161 The mean performance of Number of Seeds per pod in variety G2-315 ranged from T₄ Neem
162 seed extract 1% (1.100) to T₉ KNO₃ 5% (1.933) with mean value of 1.4637. Significantly taken
163 highest Seeds per pod flowering (1.933) was reported in T₉ KNO₃ 5% and it was followed by
164 by T₈ KNO₃ 3% (1.833) T₇ KNO₃ 1% (1.733) , T₃tulsi leaf extract 5% (1.567), T₃tulsi leaf extract
165 3% (1.400) T₁tulsi leaf extract 1% (1.303) .Minimum Number of Seeds per pod was recorded
166 by T₁₀ with control (1.000). Similar result was observed by Nelakurthi Venkata Praveen *et al.*,
167 (2020) Deepak Chand Bhatshwari *et al.*, (2020) G. Abdul Wajid *et al.*, (2021)

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169 **6. Seed yield per plot (kg):**

170 The mean performance of Seed yield per plot in variety G2-315 ranged from T₄ Neem seed extract
171 1% (500.00) to T₉ KNO₃ 5% (707.46) with mean value of 580.48. Significantly taken highest
172 Seed yield per plot flowering (707.46) was reported in T₉ KNO₃ 5% and it was followed by T₈
173 KNO₃ 3% (699.70) T₇ KNO₃ 1% (685.93) , T₃tulsi leaf extract 5% (641.46), T₃tulsi leaf extract
174 3% (531.16) T₁tulsi leaf extract 1% (515.60) .Minimum Seed yield per plot (kg) was recorded
175 by T₁₀ with control (493.70). Nelakurthi Venkata Praveen *et al.*, (2020) Deepak Chand
176 Bhatshwari *et al.*, (2020) G. Abdul Wajid *et al.*, (2021)

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178 **Effect of different priming methods Seed quality parameters:**

179 **7.100 seed weight (gms):**

180 The mean performance of hundred seed weight in variety G2-315 ranged from T₄ Neem seed
181 extract 1% (10.66) to T₉ KNO₃ 5% (17.13) with mean value of 13.51. Significantly taken highest
182 hundred seed weight flowering (17.13) was reported in T₉ KNO₃ 5% and it was followed by
183 T₃tulsi leaf extract 5% (16.36), T₈ KNO₃ 3% (15.90) T₇ KNO₃ 1% (14.36) , T₂tulsi leaf extract
184 3% (13.93), T₁tulsi leaf extract 1% (13.16). Minimum hundred seed weight was recorded by T₁₀
185 with control (9.63). Similar result was observed by Nelakurthi Venkata Praveen *et al.*, (2020)

186 **8. Seed germination percentage (%): formula and reference**

187 The mean performance of Seed germination percentage in variety G2-315 ranged from T₄ Neem
188 seed extract 1% (81.10) to T₉ KNO₃ 5% (94.80) with mean value of 88.44. Significantly taken
189 highest Seed germination percentage flowering (94.80) was reported in T₉ KNO₃ 5% and it was
190 followed by T₈ KNO₃ 3% (93.20) T₇ KNO₃ 1% (92.93) , T₃tulsi leaf extract 5% (92.73),
191 T₃tulsi leaf extract 3% (90.43) T₁tulsi leaf extract 1% (88.30) .Minimum Seed germination
192 percentage (%) was recorded by T₁₀ with control (79.10). The present findings are in
193 confirmation with the results of Kalyanrao Patil *et al.*, (2018) Nelakurthi Venkata Praveen *et al.*,
194 (2020)

195 **9. Shoot length (cm):**

196 The mean performance of Shoot length (cm) in variety 1 –G2-315 ranged from T₄ Neem seed
197 extract 1% (11.73) to T₉ KNO₃ 5% (15.93) with mean value of 13.21. Significantly taken highest
198 Shoot length (cm) flowering (15.93) was reported in T₉ KNO₃ 5% and it was followed by T₈
199 KNO₃ 3% (15.10) T₇ KNO₃ 1% (14.60) , T₃tulsi leaf extract 5% (14.43), T₃tulsi leaf extract 3%
200 (13.06) T₁tulsi leaf extract 1% (12.90) .Minimum Shoot length (cm) was recorded by T₁₀ with
201 control (9.83). the finding are in Sampathi Sowjanya *et al.*, (2020) G. Abdul Wajid *et al.*,
202 (2021)

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204 **10. Root length (cm):**

205 The mean performance of Root length (cm) in variety G2-315 ranged from T₄ Neem seed extract

206 1% (1.50) to T₉ KNO₃ 5% (2.13) with mean value of 1.68. Significantly taken highest Root
207 length (cm) flowering (2.13) was reported in T₉ KNO₃ 5% and it was followed by byT₈ KNO₃
208 3% (1.96) T₇ KNO₃ 1% (1.90), T₃tulsi leaf extract 5% (1.70), T₃tulsi leaf extract 3% (1.63)
209 T₁tulsi leaf extract 1% (1.56) .Minimum Root length (cm) was recorded by T₁₀ with control
210 (1.36)Similar result was observed by Kalyanrao Patil *et al.*, (2018) Nelakurthi Venkata Praveen
211 *et al.*, (2020)

212 **11. Seedling length (cm):**

213 The mean performance ofseedling length (cm)in varietyG2-315 ranged from T₄ Neem seed
214 extract 1% (13.23) to T₉ KNO₃ 5% (18.06) with mean value of 14.89. Significantly taken highest
215 seedling length (cm) flowering (18.06) was reported in T₉ KNO₃ 5% and it was followed by
216 byT₈ KNO₃ 3% (17.06) T₇ KNO₃ 1% (16.50), T₃tulsi leaf extract 5% (16.13), T₃tulsi leaf extract
217 3% (14.70) T₁tulsi leaf extract 1% (14.46) .Minimum seedling length (cm) was recorded by T₁₀
218 with control (11.20). the finding are in Sampathi Sowjanya *et al.*, (2020) G. Abdul Wajidet *al.*,
219 (2021)

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221 **12. Seedling Fresh weight (gms):**

222 The mean performance of Seedling Fresh weight in variety G2-315 ranged from T₄ Neem seed
223 extract 1% (6.20) to T₉ KNO₃ 5% (8.43) with mean value of 7.03. Significantly taken highest
224 Seedling Fresh weight flowering (8.43) was reported in T₉ KNO₃ 5% and it was followed by
225 T₃tulsi leaf extract 5% (7.90), T₈ KNO₃ 3% (7.80) T₇ KNO₃ 1% (7.42) , T₂tulsi leaf extract 3%
226 (7.06), T₁tulsi leaf extract 1% (6.64). Minimum Seedling Fresh weight was recorded by T₁₀ with
227 control (5.90). Similar result was observed by Singh Kalyanrao Patil *et.al.* (2018)

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229 **13. Seedling Dry weight (gms):**

230 The mean performance ofSeedling Dry weight (gms)in varietyG2-315 ranged from T₄ Neem
231 seed extract 1% (1.44) to T₉ KNO₃ 5% (2.16) with mean value of 1.69. Significantly taken
232 highest Seedling Dry weight (gms) flowering (2.16) was reported in T₉ KNO₃ 5% and it was
233 followed by byT₈ KNO₃ 3% (1.98) T₇ KNO₃ 1% (1.93), T₃tulsi leaf extract 5% (1.87), T₃tulsi
234 leaf extract 3% (1.69) T₁tulsi leaf extract 1% (1.60) .Minimum Seedling Dry weight (gms) was
235 recorded by T₁₀ with control (1.17). the finding are in G. Abdul Wajidet *al.*, (2021)

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237 **14. Seedling vigour index I: definition? Formula?**

238 The mean performance ofSeedling vigour index 1in varietyG2-315 ranged from T₄ Neem seed
239 extract 1% (1.073.48) to T₉ KNO₃ 5% (1.712.74) with mean value of 1326.70. Significantly
240 taken highest Seedling vigour index flowering (1.712.74) was reported in T₉ KNO₃ 5% and it
241 was followed by byT₈ KNO₃ 3% (1.590.70) T₇ KNO₃ 1% (1.533.60), T₃tulsi leaf extract 5%
242 (1.496.70), T₃tulsi leaf extract 3% (1.329.21) T₁tulsi leaf extract 1% (1.277.19) .Minimum
243 Seedling vigour index was recorded by T₁₀ with control (885.95) Similar results was finding by
244 Kalyanrao Patil *et al.*, (2018) Nelakurthi Venkata Praveen *et al.*, (2020)

245 **15. Seedling vigour index II:**

246 The mean performance ofSeedling vigour index 2in varietyG2-315 ranged from T₄ Neem seed
247 extract 1% (117.27) to T₉ KNO₃ 5% (204.71) with mean value of 150.95. Significantly taken
248 highest Seedling vigour index flowering (204.71) was reported in T₉ KNO₃ 5% and it was
249 followed by byT₈ KNO₃ 3% (185.17) T₇ KNO₃ 1% (179.66), T₃tulsi leaf extract 5% (173.80),
250 T₃tulsi leaf extract 3% (153.12) T₁tulsi leaf extract 1% (141.27) .Minimum Seedling vigour
251 index was recorded by T₁₀ with control (93.16) Similar results was observed findingKalyanrao

252 Patil *et al.*, (2018) Nelakurthi Venkata Praveen *et al.*, (2020)

253

254 **16. Electrical conductivity (ds/m):**

255 The mean performance of Electrical conductivity in variety G2-315 ranged from T₉ KNO₃ 5%
 256 (1.933) to T₄ Neem seed extract 1% (3.400) with mean value of 2.9367. Significantly taken
 257 highest Electrical conductivity flowering (3.933) was reported in T₁₀ control and it was followed
 258 by T₄Neem seed extract 1% (3.400) T₅ Neem seed extract 5% (3.233) T₁tulsi leaf extract 1%
 259 (3.200) T₂tulsi leaf extract 3% (2.933), T₃tulsi leaf extract 5% (2.700) .Minimum Electrical
 260 conductivity was recorded by T₉ KNO₃ 5% (1.933) .Similar result was observed by Kalyanrao
 261 Patil *et al.*, (2018) Nelakurthi Venkata Praveen *et al.*, (2020)

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265 **Table:2 Mean performance of chickpea for 7 quantitative chickpea Variety G2-315field**

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267 **Incomplete title**

	Treatment Name	Plant height at maturity (cm)	Primary Branches Per Plant	Days to 50% Flowering	Pods Per Plant	Seeds Per Pod	Plot Yield (gms)	100 Seed Weight (gms)
T1	Tulsi 1%	58.133	2.767	88.667	115.667	1.303	515.600	13.167
T2	Tulsi 3%	59.633	3.000	87.333	119.333	1.400	531.167	13.933
T3	Tulsi 5%	68.500	3.133	74.333	133.000	1.567	641.467	16.367
T4	Neem seed extract 1%	54.000	2.033	94.000	103.000	1.100	500.000	10.667
T5	Neem seed extract 3%	56.000	2.367	92.000	109.000	1.233	511.933	11.467
T6	Neem seed extract 5%	57.467	2.367	89.000	113.000	1.533	517.867	12.467
T7	KNO3-1%	64.400	3.333	74.333	126.333	1.733	685.933	14.367
T8	KNO3-3%	64.567	3.500	72.000	125.667	1.833	699.700	15.900
T9	KNO3-5%	72.067	3.667	69.667	134.333	1.933	707.467	17.133
T10	Control	43.300	1.667	99.000	97.667	1.000	493.700	9.633
C.D.		3.577	0.661	4.795	8.232	0.207	12.493	0.569
SE(m)		1.195	0.221	1.601	2.749	0.069	4.172	0.190
SE(d)		1.689	0.312	2.265	3.888	0.098	5.901	0.269
C.V.		3.460	13.735	3.301	4.046	8.165	1.245	2.438

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276 **Table:3 Mean performance of chickpea for 9 quantitative chickpea lab condition variety**

277 G2-315

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	Treatment Name	Seed Germination Percentage (%)	Shoot Length	Root Length	Seedling Length	Fresh Weight of Seedling(gms)	Dry Weight Of Seedling(gms)	Vigour Index 1	Vigour Index 2	Electrical Conductivity
T1	Tulsi 1%	88.300	12.900	1.567	14.467	6.643	1.600	1,277.193	141.274	3.200
T2	Tulsi 3%	90.433	13.067	1.633	14.700	7.067	1.693	1,329.210	153.121	2.933
T3	Tulsi 5%	92.733	14.433	1.700	16.133	7.900	1.873	1,496.707	173.803	2.700
T4	Neem seed extract 1%	81.100	11.733	1.500	13.233	6.207	1.447	1,073.480	117.277	3.400
T5	Neem seed extract 3%	84.200	11.900	1.500	13.400	6.313	1.493	1,128.617	125.773	3.233
T6	Neem seed extract 5%	87.633	12.600	1.533	14.133	6.657	1.547	1,238.843	135.603	3.233
T7	KNO ₃ -1%	92.933	14.600	1.900	16.500	7.423	1.933	1,533.600	179.660	2.567
T8	KNO ₃ -3%	93.200	15.100	1.967	17.067	7.807	1.987	1,590.707	185.172	2.233
T9	KNO ₃ -5%	94.800	15.933	2.133	18.067	8.437	2.160	1,712.747	204.714	1.933
T10	Control	79.100	9.833	1.367	11.200	5.900	1.177	885.950	93.167	3.933
C.D.		2.078	0.790	0.150	0.761	0.323	0.157	83.803	15.204	0.333
SE(m)		0.694	0.264	0.050	0.254	0.108	0.053	27.989	5.078	0.111
SE(d)		0.981	0.373	0.071	0.359	0.153	0.074	39.582	7.181	0.157
C.V.		1.359	3.460	5.174	2.955	2.658	5.379	3.654	5.826	6.550

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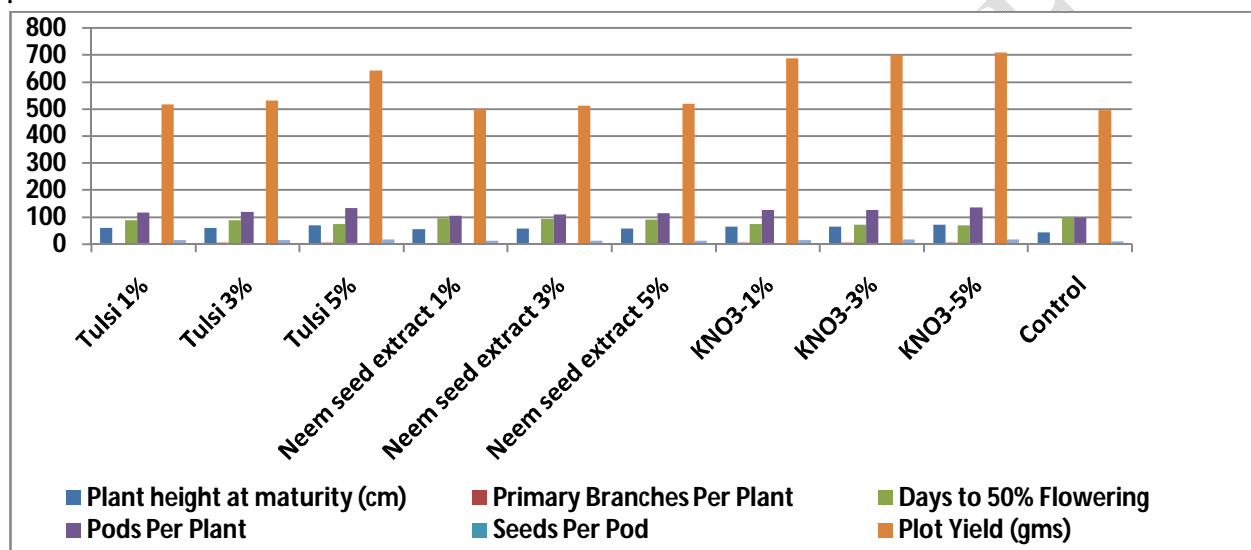
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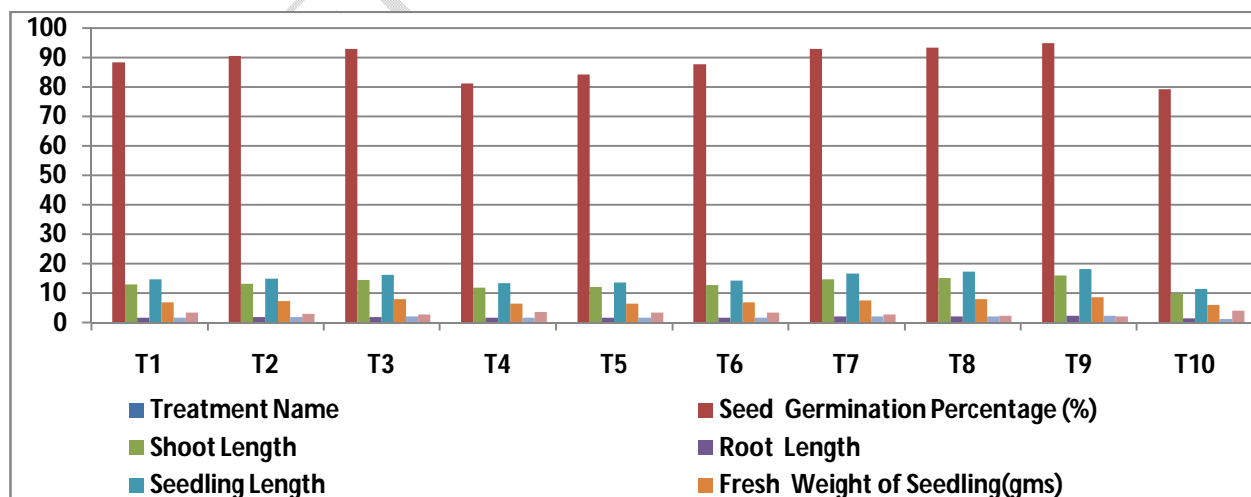
Conclusion: Figures in Conclusion ?

In conclusion the priming increases the germinability and vigour of chickpea seeds, significantly all the field parameters. KNO_3 5% with significantly increased the germination per cent and other seedling characters of chickpea. KNO_3 showed maximum increase in germinability and vigour and showed maximum increase in germination. Priming of the chickpea seeds for 12 hrs, in which best result to enhanced germinability, vigour and seedling characters. These conclusions are based on the results of six months investigation and therefore further investigation is needed to arrive at valid recommendations.



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Fig No: 1 Mean performance of variety G₂315 field condition



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Fig No: 2 Mean performance of variety G₂315 lab condition

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UNDER PEER REVIEW