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Sakshi A Wande
PG Scholar, Seed Science and
Technology, Department of
Agricultural Botany, Post
Graduate Institute, Akola, Dr.
PDKV, Akola, Maharashtra, India

Dr. JN Parmar
Assistant Professor, Department of
Agricultural Botany, Post
Graduate Institute, Akola, Dr.
PDKV, Akola, Maharashtra, India

Indira B Soneji
Assistant Research Biochemist,
AICRP on PHET, Dr. PDKV,
Akola, Maharashtra, India

Dr. SK Burghate
Assistant Professor, Department of
Agricultural Botany, Post
Graduate Institute, Akola, Dr.
PDKV, Akola, Maharashtra, India

Dr. Amrapali A Akhare
Seed Research Officer, Seed
Technology Research Unit, Dr.
PDKV, Akola, Maharashtra, India

Dr. GK Lande
Assistant Seed Research Officer,
Seed Technology Research Unit,
Dr. PDKV, Akola, Maharashtra,
India

SJ Pande
PG Scholar, Seed Science and
Technology, Department of
Agricultural Botany, Post
Graduate Institute, Akola, Dr.
PDKV, Akola, Maharashtra, India

RS Amle
PG Scholar, Seed Science and
Technology, Department of
Agricultural Botany, Post
Graduate Institute, Akola, Dr.
PDKV, Akola, Maharashtra, India

PR Meshram
PG Scholar, Seed Science and
Technology, Department of
Agricultural Botany, Post
Graduate Institute, Akola, Dr.
PDKV, Akola, Maharashtra, India

Corresponding Author:
Sakshi A Wande
PG Scholar, Seed Science and
Technology, Department of
Agricultural Botany, Post
Graduate Institute, Akola, Dr.
PDKV, Akola, Maharashtra, India

Seed protectant-mediated retention of physiological quality and seedling vigour in chickpea (*Cicer arietinum* L.) during storage

Sakshi A Wande, JN Parmar, Indira B Soneji, SK Burghate, Amrapali A Akhare, GK Lande, SJ Pande, RS Amle and PR Meshram

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Abstract

The laboratory study was conducted during 2025-26 at the Seed Technology Research Unit, Dr. Panjabrao Deshmukh Krishi Vidyapeeth, Akola, Maharashtra, to evaluate the influence of botanical and chemical seed treatments on the physiological quality and seedling vigour of chickpea seed during prolonged storage. Seed of chickpea variety *PDKV Kanak* was treated with five botanical oils and five chemical insecticides along with an untreated control and stored under ambient conditions for 270 days. The experiment was laid out in a Completely Randomized Design with three replications and observations were recorded at 0, 30, 60, 90, 120, 150, 180, 210, 240 and 270 days after storage on seed germination, root length, shoot length, seedling dry weight, seedling vigour index-I and seedling vigour index-II. All physiological attributes declined progressively with advancement of storage although the magnitude of deterioration differed among treatments. At 270 days, Emamectin benzoate @ 40 mg kg⁻¹ seed recorded the highest root length (11.00 cm) and seedling vigour index-I (1574), while Spinetoram 11.7 SC @ 8.5 mg kg⁻¹ seed recorded the highest seedling dry weight (123.25 mg) and seedling vigour index-II (10015). Germination was highest with Emamectin benzoate and Dinotefuran (81.75% each) followed by Spinetoram (81.25%). Among botanicals, Neem oil @ 5 ml kg⁻¹ seed maintained the highest physiological quality at advanced storage stages. The untreated control recorded the lowest values for the major quality attributes at 270 days. The findings indicate that appropriate pre-storage seed treatment can substantially delay storage-associated deterioration and prolong the physiological storability of chickpea seed.

Keywords: Chickpea, seed storability, seed treatment, botanical oils, chemical protectants, germination, seedling vigour, storage

Introduction

Chickpea (*Cicer arietinum* L.) is an important food legume valued for its nutritional contribution and adaptability to relatively dry production environments. Preservation of seed physiological quality after harvest is essential because storage-induced deterioration progressively reduces germination, seedling growth and crop-establishment potential. Temperature, relative humidity, seed moisture and duration of storage influence the rate of deterioration. In addition to physiological ageing, stored chickpea is vulnerable to the pulse beetle, *Callosobruchus chinensis* whose feeding activity can damage cotyledonary tissues and reduce seed viability and vigour.

Seed deterioration is a progressive process in which loss of vigour precedes complete loss of viability. Consequently, seed germination alone may not adequately describe the physiological status of a stored seed lot; root and shoot growth, seedling dry matter and vigour indices provide complementary information on the capacity of aged seeds to produce vigorous seedlings. Further emphasizes that seed ageing is associated with membrane deterioration, altered metabolism, impaired reserve mobilization and oxidative stress which ultimately affect germination and seedling development.

Botanical oils offer an alternative or complementary approach to synthetic protectants because plant-derived materials may possess insecticidal, repellent and antifeedant properties. Chemical seed protectants can provide more predictable protection against

storage pests, but their use should be judicious. Therefore, the present study compared selected botanical and chemical seed treatments for their ability to preserve physiological seed quality of chickpea during nine months of storage with emphasis on germination, seedling growth, dry matter and vigour indices.

Materials and Methods

The laboratory study was conducted during 2025-26 at the Seed Technology Research Unit (STRU), Dr. PDKV, Akola, Maharashtra using chickpea (*Cicer arietinum* L.) variety *PDKV Kanak*. The seed lot was manually cleaned and subjected to the respective seed treatments prior to storage. The experiment comprised eleven treatments including an untreated control (T_0), five botanical oils viz., castor oil @ 5 ml kg⁻¹ seed (T_1), mustard oil @ 5 ml kg⁻¹ seed (T_2), neem oil @ 5 ml kg⁻¹ seed (T_3), sesame oil @ 5 ml kg⁻¹ seed (T_4) and karanj oil @ 5 ml kg⁻¹ seed (T_5), and five chemical insecticides viz., emamectin benzoate @ 40 mg kg⁻¹ seed (T_6), spinetoram 11.7 SC @ 8.5 mg kg⁻¹ seed (T_7), Sivanto 17.09% SL @ 0.01 ml kg⁻¹ seed (T_8), deltamethrin (Decis) 2.8% EC @ 0.04 ml kg⁻¹ seed (T_9) and dinotefuran 20 SG @ 10 mg kg⁻¹ seed (T_{10}). The treated seed was maintained under ambient storage conditions for 270 days in a Completely Randomized Design (CRD) with three replications. Representative seed samples were withdrawn at 0, 30, 60, 90, 120, 150, 180, 210, 240 and 270 days after storage (DAS) for assessment of physiological seed quality.

Standard germination testing was employed to determine germination percentage. On the eighth day of the germination test, ten normal seedlings were randomly selected from each replication for measurement of root and shoot length. Root length was measured from the point of attachment of the seed to the tip of the primary root, whereas shoot length was measured from the point of attachment to the shoot tip and the observations were expressed in centimetres. For determination of seedling dry weight, the same normal seedlings used for root and shoot measurements were dried in a hot-air oven at $103 \pm 2^\circ\text{C}$ for 17 ± 1 h, cooled and weighed with the mean values expressed in milligrams.

Seedling vigour index-I was computed as the product of germination percentage and total seedling length where total seedling length represented the combined root and shoot length. Seedling vigour index-II was calculated as the product of germination percentage and seedling dry weight. Thus, the physiological response of treated chickpea seed during storage was evaluated through seed germination, root length, shoot length, seedling dry weight and vigour indices-I and II.

Results and Discussion

Seed germination exhibited a progressive decline with increasing storage duration across all treatments indicating gradual deterioration of seed viability during ageing. Treatment differences remained statistically non-significant up to 60 DAS but became significant from 90 DAS onwards. At 270 DAS, seed germination ranged from 70.25 to 81.75 per cent. The highest germination was recorded with emamectin benzoate @ 40 mg kg⁻¹ seed (T_6) and

dinotefuran 20 SG @ 10 mg kg⁻¹ seed (T_{10}), each recording 81.75 per cent followed by spinetoram 11.7 SC @ 8.5 mg kg⁻¹ seed (T_7) with 81.25 per cent. Among the botanical treatments, neem oil @ 5 ml kg⁻¹ seed (T_3) retained the highest germination (77.50%), followed by castor oil (T_1) at 77.00 per cent. While, the untreated control declined from 95.50 per cent at 0 DAS to 70.25 per cent at 270 DAS. The comparatively greater retention of germination in treated seed lots indicates delayed deterioration and better preservation of seed viability during storage.

Root length progressively decreased with advancement of storage duration, with treatment differences remaining non-significant up to 90 DAS and becoming significant from 120 DAS onwards. Emamectin benzoate (T_6) consistently maintained the highest root length declining from 15.00 cm at 0 DAS to 11.00 cm at 270 DAS followed by spinetoram (T_7) at 10.88 cm. Among botanicals, neem oil (T_3) recorded the highest root length of 10.50 cm at 270 DAS, whereas the untreated control exhibited the greatest decline from 12.38 cm to 7.25 cm. Shoot length also showed a progressive reduction during storage with significant treatment differences appearing from 120 DAS. At 270 DAS, dinotefuran (T_{10}) recorded the maximum shoot length (8.63 cm) followed by neem oil (T_3) at 8.38 cm, Sivanto (T_8) at 8.28 cm and emamectin benzoate (T_6) and spinetoram (T_7) at 8.25 cm each while the untreated control recorded 6.23 cm. The comparatively greater root and shoot growth retained by treated seed indicates better preservation of physiological competence and post-germination growth potential under prolonged storage.

Seedling dry weight declined progressively with storage duration with significant treatment differences emerging from 120 DAS onwards. At 270 DAS, spinetoram (T_7) recorded the maximum seedling dry weight (123.25 mg) followed by emamectin benzoate (T_6) at 122.50 mg and dinotefuran (T_{10}) and neem oil (T_3) each at 118.75 mg. The untreated control showed a marked reduction from 136.00 mg at 0 DAS to 81.25 mg at 270 DAS. Seedling vigour index-I similarly declined progressively as a consequence of reductions in germination and seedling length. At 270 DAS, the highest vigour index-I was recorded with emamectin benzoate (T_6) at 1574 followed by spinetoram (T_7) at 1554 and dinotefuran (T_{10}) at 1532, while neem oil (T_3) was the best botanical treatment with 1463; the untreated control recorded the lowest value (947).

Seedling vigour index-II also exhibited a progressive decline with increasing storage duration, reflecting the combined reduction in germination and seedling dry matter accumulation. At 270 DAS, spinetoram (T_7) recorded the highest vigour index-II (10015), closely followed by emamectin benzoate (T_6) at 10014 and dinotefuran (T_{10}) at 9705. Among the botanical treatments, neem oil (T_3) recorded the highest value (9205), whereas the untreated control recorded the minimum (5713). Overall, the results demonstrate that seed protectant treatments predominantly Emamectin benzoate, Spinetoram and Dinotefuran among the chemical treatments and Neem oil among the botanicals were more effective in retaining seed germination, seedling growth, dry matter accumulation and vigour during prolonged storage.

Table 1: Influence of botanical and chemical seed treatments on seed germination (%) of chickpea

Treatment	0 DAS	30 DAS	60 DAS	90 DAS	120 DAS	150 DAS	180 DAS	210 DAS	240 DAS	270 DAS
Control (untreated) (T ₀)	95.50 (77.77)	92.25 (73.96)	91.75 (73.43)	84.50 (66.82)	81.50 (64.53)	80.00 (63.44)	77.50 (61.69)	75.25 (60.17)	72.25 (58.22)	70.25 (56.95)
Castor oil @ 5 ml kg ⁻¹ seed (T ₁)	95.50 (77.77)	94.00 (75.90)	93.50 (75.24)	91.25 (72.81)	88.75 (70.41)	85.50 (67.62)	83.50 (66.05)	79.75 (63.26)	77.25 (61.52)	77.00 (61.35)
Mustard oil @ 5 ml kg ⁻¹ seed (T ₂)	95.75 (78.12)	93.50 (75.47)	93.00 (74.73)	90.75 (72.31)	88.25 (69.96)	82.25 (65.10)	80.50 (63.80)	77.75 (61.86)	75.00 (60.00)	74.50 (59.68)
Neem oil @ 5 ml kg ⁻¹ seed (T ₃)	96.00 (78.51)	92.75 (74.54)	92.25 (74.04)	89.50 (71.12)	87.50 (69.31)	85.25 (67.43)	83.00 (65.65)	80.25 (63.62)	78.25 (62.20)	77.50 (61.69)
Sesame oil @ 5 ml kg ⁻¹ seed (T ₄)	95.75 (78.16)	93.50 (75.37)	93.00 (74.84)	89.25 (70.87)	86.50 (68.45)	82.75 (65.48)	81.25 (64.35)	78.00 (62.03)	75.50 (60.34)	75.50 (60.34)
Karanj oil @ 5 ml kg ⁻¹ seed (T ₅)	96.00 (78.51)	93.00 (74.81)	92.75 (74.55)	88.00 (69.74)	86.25 (68.24)	83.00 (65.65)	81.50 (64.53)	78.25 (62.21)	77.50 (61.70)	75.50 (60.34)
Emamectin benzoate @ 40 mg kg ⁻¹ seed (T ₆)	96.00 (78.51)	93.50 (75.26)	93.00 (74.70)	91.75 (73.31)	89.00 (70.64)	87.50 (69.30)	87.75 (69.63)	85.25 (67.42)	84.25 (66.62)	81.75 (64.72)
Spinetoram 11.7 SC @ 8.5 mg kg ⁻¹ seed (T ₇)	96.00 (78.51)	96.25 (78.85)	95.75 (78.19)	93.00 (74.68)	91.00 (72.55)	88.25 (69.96)	86.75 (68.68)	85.00 (67.22)	83.50 (66.05)	81.25 (64.35)
Sivanto 17.09% SL @ 0.01 ml kg ⁻¹ seed (T ₈)	96.00 (78.51)	95.25 (77.43)	94.75 (76.82)	92.25 (73.86)	90.00 (71.58)	88.50 (70.18)	85.00 (67.23)	83.75 (66.23)	80.00 (63.44)	79.50 (63.09)
Deltamethrin (Decis) 2.8% EC @ 0.04 ml kg ⁻¹ seed (T ₉)	96.00 (78.51)	94.00 (76.02)	93.50 (75.28)	91.50 (73.06)	89.50 (71.10)	87.50 (69.30)	86.25 (68.26)	84.00 (66.43)	80.75 (63.98)	79.00 (62.73)
Dinotefuran 20 SG @ 10 mg kg ⁻¹ seed (T ₁₀)	96.00 (78.51)	95.00 (77.08)	94.50 (76.47)	92.00 (73.59)	89.75 (71.34)	86.75 (68.66)	86.75 (68.68)	84.50 (66.82)	82.25 (65.08)	81.75 (64.72)
SE(m)±	0.384	0.870	0.874	0.433	0.417	0.490	0.815	0.429	0.547	0.685
CD at 1%	NS	NS	NS	1.674	1.614	1.896	3.152	1.657	2.115	1.972

DAS - Days after storage NS - Non significant

Table 2: Influence of botanical and chemical seed treatments on root length (cm) of chickpea

Treatment	0 DAS	30 DAS	60 DAS	90 DAS	120 DAS	150 DAS	180 DAS	210 DAS	240 DAS	270 DAS
Control (untreated) (T ₀)	12.38	12.25	11.63	11.38	9.38	9.13	8.88	8.00	7.38	7.25
Castor oil @ 5 ml kg ⁻¹ seed (T ₁)	13.50	13.25	12.75	12.00	11.63	11.13	10.88	10.25	10.13	9.50
Mustard oil @ 5 ml kg ⁻¹ seed (T ₂)	12.63	12.50	12.00	11.50	10.50	10.38	10.13	9.50	9.25	8.63
Neem oil @ 5 ml kg ⁻¹ seed (T ₃)	13.88	13.75	13.00	12.63	12.00	11.88	11.63	11.38	11.13	10.50
Sesame oil @ 5 ml kg ⁻¹ seed (T ₄)	13.38	13.25	12.75	12.00	11.38	11.00	10.75	10.50	10.00	9.50
Karanj oil @ 5 ml kg ⁻¹ seed (T ₅)	13.25	13.00	12.50	11.63	11.50	11.13	10.88	10.38	9.63	9.38
Emamectin benzoate @ 40 mg kg ⁻¹ seed (T ₆)	15.00	14.88	14.38	14.00	14.13	13.63	13.38	12.13	11.88	11.00
Spinetoram 11.7 SC @ 8.5 mg kg ⁻¹ seed (T ₇)	13.50	13.38	12.88	12.50	13.00	12.50	12.25	11.63	11.38	10.88
Sivanto 17.09% SL @ 0.01 ml kg ⁻¹ seed (T ₈)	13.00	12.75	12.25	11.75	12.25	12.13	11.88	10.63	10.13	9.78
Deltamethrin (Decis) 2.8% EC @ 0.04 ml kg ⁻¹ seed (T ₉)	13.75	13.63	13.13	12.75	12.13	11.75	11.50	11.38	11.00	9.25
Dinotefuran 20 SG @ 10 mg kg ⁻¹ seed (T ₁₀)	13.50	13.38	12.88	12.38	12.00	11.88	11.63	11.00	10.63	10.13
SE(m)±	0.689	0.683	1.149	1.077	0.601	0.531	0.554	0.642	0.703	0.490
CD at 1%	NS	NS	NS	NS	2.323	2.053	2.141	2.481	2.718	1.896

DAS - Days after storage NS - Non significant

Table 3: Influence of botanical and chemical seed treatments on shoot length (cm) of chickpea

Treatment	0 DAS	30 DAS	60 DAS	90 DAS	120 DAS	150 DAS	180 DAS	210 DAS	240 DAS	270 DAS
Control (untreated) (T ₀)	10.38	9.63	9.50	9.00	8.38	8.13	7.88	6.75	6.63	6.23
Castor oil @ 5 ml kg ⁻¹ seed (T ₁)	11.13	10.88	10.63	10.13	9.75	9.50	9.13	8.50	8.38	8.25
Mustard oil @ 5 ml kg ⁻¹ seed (T ₂)	10.13	10.13	9.50	9.38	9.13	9.00	8.63	8.38	8.25	8.13

seed (T ₂)										
Neem oil @ 5 ml kg ⁻¹ seed (T ₃)	10.88	10.88	10.63	10.38	10.00	9.63	9.38	9.00	8.63	8.38
Sesame oil @ 5 ml kg ⁻¹ seed (T ₄)	10.38	10.38	10.38	10.13	9.75	9.50	9.13	8.75	8.50	8.25
Karanj oil @ 5 ml kg ⁻¹ seed (T ₅)	10.88	10.88	10.50	10.38	9.75	9.63	9.25	8.75	8.50	8.25
Emamectin benzoate @ 40 mg kg ⁻¹ seed (T ₆)	11.38	11.13	11.13	10.88	10.50	10.00	9.50	9.25	9.00	8.25
Spinetoram 11.7 SC @ 8.5 mg kg ⁻¹ seed (T ₇)	11.13	11.00	10.88	10.50	10.13	9.75	9.38	8.88	8.63	8.25
Sivanto 17.09% SL @ 0.01 ml kg ⁻¹ seed (T ₈)	11.38	11.50	10.88	10.63	10.13	9.50	9.13	8.88	8.50	8.28
Deltamethrin (Decis) 2.8% EC @ 0.04 ml kg ⁻¹ seed (T ₉)	10.13	10.25	10.13	10.00	9.75	9.38	8.88	8.63	8.38	8.20
Dinotefuran 20 SG @ 10 mg kg ⁻¹ seed (T ₁₀)	11.63	11.13	10.88	10.75	10.25	9.75	9.40	9.25	8.75	8.63
SE(m)±	0.526	0.487	0.526	0.413	0.343	0.311	0.288	0.343	0.245	0.320
CD at 1%	NS	NS	NS	NS	1.325	1.201	1.114	1.325	0.948	1.237

DAS - Days after storage NS - Non significant

Table 4: Influence of botanical and chemical seed treatments on seedling dry weight (mg) of chickpea

Treatment	0 DAS	30 DAS	60 DAS	90 DAS	120 DAS	150 DAS	180 DAS	210 DAS	240 DAS	270 DAS
Control (untreated) (T ₀)	136.00	136.75	134.75	128.25	109.25	106.25	102.50	88.75	83.75	81.25
Castor oil @ 5 ml kg ⁻¹ seed (T ₁)	146.75	144.50	140.25	135.50	136.75	132.25	126.25	112.50	112.50	113.75
Mustard oil @ 5 ml kg ⁻¹ seed (T ₂)	138.50	142.75	140.00	129.75	122.50	120.50	116.25	107.50	107.50	107.50
Neem oil @ 5 ml kg ⁻¹ seed (T ₃)	147.50	144.25	140.00	133.25	135.75	132.50	130.75	122.00	118.75	118.75
Sesame oil @ 5 ml kg ⁻¹ seed (T ₄)	144.50	142.00	139.25	134.75	129.75	127.50	124.00	116.25	112.50	113.75
Karanj oil @ 5 ml kg ⁻¹ seed (T ₅)	146.50	143.50	141.50	133.25	133.00	128.75	127.00	115.75	111.25	112.50
Emamectin benzoate @ 40 mg kg ⁻¹ seed (T ₆)	151.00	151.50	149.50	142.00	145.50	142.00	139.50	130.75	132.75	122.50
Spinetoram 11.7 SC @ 8.5 mg kg ⁻¹ seed (T ₇)	147.75	148.00	144.75	139.25	140.00	139.25	136.25	123.25	126.25	123.25
Sivanto 17.09% SL @ 0.01 ml kg ⁻¹ seed (T ₈)	148.50	147.50	144.25	138.00	140.75	135.75	133.50	117.50	117.50	113.75
Deltamethrin (Decis) 2.8% EC @ 0.04 ml kg ⁻¹ seed (T ₉)	145.00	144.25	141.75	135.25	137.00	133.75	130.00	120.00	122.50	113.75
Dinotefuran 20 SG @ 10 mg kg ⁻¹ seed (T ₁₀)	146.75	146.50	144.25	137.50	140.50	136.50	132.50	121.25	121.25	118.75
SE(m)±	3.415	4.469	5.640	5.128	3.295	2.629	5.181	3.444	4.541	2.627
CD at 1%	NS	NS	NS	NS	12.735	10.163	20.026	13.312	10.155	10.155

DAS - Days after storage NS - Non significant

Table 5: Influence of botanical and chemical seed treatments on seedling vigour index I of chickpea

Treatment	0 DAS	30 DAS	60 DAS	90 DAS	120 DAS	150 DAS	180 DAS	210 DAS	240 DAS	270 DAS
Control (untreated) (T ₀)	2172	2017	1936	1774	1477	1380	1297	1110	1013	947
Castor oil @ 5 ml kg ⁻¹ seed (T ₁)	2352	2266	2184	1994	1886	1763	1670	1495	1429	1367
Mustard oil @ 5 ml kg ⁻¹ seed (T ₂)	2178	2113	1998	1866	1736	1592	1510	1390	1313	1248
Neem oil @ 5 ml kg ⁻¹ seed (T ₃)	2376	2282	2175	2059	1912	1833	1743	1636	1545	1463
Sesame oil @ 5 ml kg ⁻¹ seed (T ₄)	2274	2209	2148	1955	1849	1696	1614	1502	1396	1341
Karanj oil @ 5 ml kg ⁻¹ seed (T ₅)	2317	2219	2128	1957	1865	1722	1642	1496	1404	1330
Emamectin benzoate @ 40 mg kg ⁻¹ seed (T ₆)	2531	2430	2371	2289	2247	2109	2009	1822	1759	1574
Spinetoram 11.7 SC @ 8.5 mg kg ⁻¹ seed (T ₇)	2363	2346	2273	2102	2094	1969	1876	1742	1671	1554
Sivanto 17.09% SL @ 0.01 ml kg ⁻¹ seed (T ₈)	2340	2309	2191	2006	1970	1876	1786	1634	1490	1435
Deltamethrin (Decis) 2.8% EC @ 0.04 ml kg ⁻¹ seed (T ₉)	2292	2244	2171	2060	1950	1843	1757	1680	1566	1380

Dinotefuran 20 SG @ 10 mg kg ⁻¹ seed (T ₁₀)	2413	2328	2244	2087	1991	1897	1825	1712	1594	1532
SE(m)±	86.163	78.599	111.117	97.930	58.590	42.833	57.044	56.915	61.639	40.347
CD at 1%	NS	NS	NS	NS	226.476	165.566	220.500	220.001	155.957	155.957

DAS - Days after storage NS - Non significant

Table 6: Influence of botanical and chemical seed treatments on seedling vigour index II of chickpea

Treatment	0 DAS	30 DAS	60 DAS	90 DAS	120 DAS	150 DAS	180 DAS	210 DAS	240 DAS	270 DAS
Control (untreated) (T ₀)	12989	12605	12361	10836	9093	8499	7939	6680	6056	5713
Castor oil @ 5 ml kg ⁻¹ seed (T ₁)	14015	13581	13111	12369	12067	11307	10550	8969	8690	8758
Mustard oil @ 5 ml kg ⁻¹ seed (T ₂)	13259	13338	13019	11778	10833	10069	9354	8361	8063	8006
Neem oil @ 5 ml kg ⁻¹ seed (T ₃)	14160	13378	12913	11918	11908	11296	11103	9793	9291	9205
Sesame oil @ 5 ml kg ⁻¹ seed (T ₄)	13835	13275	12958	12026	11552	10548	10154	9071	8491	8590
Karanj oil @ 5 ml kg ⁻¹ seed (T ₅)	14065	13339	13130	11718	11846	10684	10593	9056	8615	8490
Emamectin benzoate @ 40 mg kg ⁻¹ seed (T ₆)	14489	14157	13896	13030	13529	13009	12619	11146	11187	10014
Spinetoram 11.7 SC @ 8.5 mg kg ⁻¹ seed (T ₇)	14182	14242	13851	12956	13081	12325	11816	10475	10550	10015
Sivanto 17.09% SL @ 0.01 ml kg ⁻¹ seed (T ₈)	14254	14050	13668	12730	12389	11777	11476	9844	9401	9044
Deltamethrin (Decis) 2.8% EC @ 0.04 ml kg ⁻¹ seed (T ₉)	13920	13556	13249	12375	12219	11669	11211	10080	9901	8991
Dinotefuran 20 SG @ 10 mg kg ⁻¹ seed (T ₁₀)	14090	13918	13632	12645	12575	11978	11513	10249	9975	9705
SE(m)±	317.710	391.280	528.094	460.818	291.120	223.621	486.148	296.271	383.240	220.979
CD at 1%	NS	NS	NS	NS	1125.307	864.393	1879.173	1145.215	1481.391	854.180

DAS - Days after storage NS - Non significant

Conclusion

Prolonged ambient storage resulted in progressive deterioration of chickpea seed physiological quality expressed through reductions in seed germination, root length, shoot length, seedling dry weight and vigour indices. The magnitude of deterioration was substantially lower in treated seed than in the untreated control mainly after 120 DAS. Emamectin benzoate @ 40 mg kg⁻¹ seed, Spinetoram 11.7 SC @ 8.5 mg kg⁻¹ seed and Dinotefuran 20 SG @ 10 mg kg⁻¹ seed consistently provided superior preservation of seed physiological quality. Among the botanical treatments, Neem oil @ 5 ml kg⁻¹ seed showed the best retention of seedling growth and vigour during prolonged storage. Overall, the findings demonstrate that suitable pre-storage seed treatment can delay storage-induced deterioration and extend the useful physiological storability of chickpea seed.

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