Journal of Pharmacognosy and Phytochemistry
Available online at www.phytojournal.com

E-ISSN: 2278-4136
P-ISSN: 2349-8234
JPP 2019; SP1: 686-688

Dr. Renu Arora
Associate Prof. in Botany,
D.A.V. College, Abohar, Punjab, India

(Special Issue- 1)
2nd International Conference
"Food Security, Nutrition and Sustainable Agriculture - Emerging Technologies"
(February 14-16, 2019)

Effect of seed treatment with latex-mixture on germination and vigor in black gram during accelerated ageing

Dr. Renu Arora

Abstract
Seeds get deteriorated in storage resulting in loss of germination and vigor. The rate of deterioration during storage increases as the seed moisture content and temperature increases. The present experiment was thus planned in laboratory to study the effect of latex-mixture on above aspects on seeds of black gram. Two varieties of black gram/urd bean (*Vigna mungo* (L.) Hepper) treated with latex-mixture extracted from latex-yielding plants i.e. *Calotropis* and *Euphorbia* were subjected to accelerated ageing conditions of storage for different periods (0 to 60 days) and tested for germination, seedling length and speed of germination. Ageing caused decrease in germination, seedling length and loss of seed vigor. The treated seeds showed significant increase in germination percent, seedling length and speed of germination at higher concentration i.e. from 40-100% over control in response to accelerated ageing condition of storage.

Keywords: Accelerated ageing, latex-mixture, black gram/ urd bean, seed storage

Introduction
On account of the biological activities taking place in seed during storage, the seed deteriorates in quality resulting in impairment of germination and vigor. There are many factors responsible for deterioration. Seed viability in storage is determined not only by the period of storage but also by the type of container used, quality of seed at the beginning of storage, storage environment and seed treatment (Chandrasenan, 1996) [1]. Seed are stored in the storage from the time of harvest to the next planting season or a subsequent year. There may be long term storage for lots of foundation and breeder seed to preserve valuable germplasm. The rate of deterioration of crop seed in storage increased as seed moisture content and temperature increases (Garg *et al.*, 1988) [2]
The present experiment was thus planned in the laboratory to study the effect of latex-mixture from two plants *Calotropis* and *Euphorbia* in response to accelerated ageing on various attributes related to germination, seedling length, vigor index and speed of germination in case of blackgram/urd bean seeds.

Materials and Methods
Freshly harvested seeds of black gram var. T-9 and PU-19 were selected for present investigation. The seed samples were treated with a mixture of latex extract taken from the latex-yielding plants i.e. *Calotropis* and *Euphorbia*. For the preparation of latex mixture of the above mentioned plants, fresh leaves of both the plants were taken, washed in water thoroughly and crushed with the help of juicer/mixer and the extract mixture was collected in a conical flask. Then seeds of both the varieties of black gram were soaked in different percentage of latex mixture like 5, 10, 20……..100% for half an hour and were labeled as T2, T3, T4……..T12. Different concentrations were prepared in water. Seeds without treatment served as control and were labeled as T1.
Thereafter treated seeds were air dried and stored in glass tubes separately with air tight cap.

Correspondence
SS Rathore
Associate Prof. in Botany,
D.A.V. College, Abohar, Punjab, India

These seeds were then subjected to accelerated ageing for 60 days by placing them in incubator at 40° C and 80% relative humidity along with control. Seed samples were drawn at 0, 15, 30, 45 and 60 days interval and tested for germination, seedling length, vigor index and speed of germination. The laboratory tests were conducted in three replications each time. Standard germination and seedling length of each variety were recorded using standard germination technique (ISTA, 1993) [3]. The vigor index was computed adopting the method of Abdul-Baki and Anderson (1973) [4]. The speed of germination was calculated by method given by Anita Kumari and Kohli (1984) [5].

Results and Discussion

In the initial stages of ageing, the germination per cent and seedling length was almost same in control as well as in all the treated seeds in both the varieties. But with progressive ageing, there was a sharp decrease in germination per cent and seedling length and it showed clear differences among various treatments. The treatments T2-T4 i.e. 5-20% showed less differences but higher concentrations of latex mixture T5-T12 i.e. (30-100%) promoted germination and also seedling length with respect to control during the process of ageing (Tables 1 and 2).

Similarly there was a decrease in vigor index and also the speed of germination as ageing progressed from 0 to 60 days (Tables 3 and 4). Among the seed treatments, latex mixture at higher concentration i.e. 30 to 100% showed significant increase in vigor index and speed of germination with respect to control in both the varieties. Vigor index determines the state of the health of seedling and ultimately the state of productivity of plant. Higher the vigor index, better will be the yield of plant (Mir *et al*., 2005) [6].

Several views have been put forward to explain the mechanism of ageing responsible for loss of vigor. Abdul-Baki and Baker (1973) [7] proposed that loss of seed vigor on ageing might be associated with changes in membrane properties of one or more cell organelles. On the other hand, Osborne *et al*. (1974) [8] postulated that during accelerated ageing, the machinery for synthesis of enzymes and hormones needed for proper seedling growth is greatly impaired leading to reduced growth rate.

Table 1: Effect of latex – mixture on germination percentage in two black gram varieties T-9 and PU-19 (seeds during accelerated ageing were stored in sealed glass bottles)

T-9								PU-19						
Stage / Days of Accelerated Ageing (S)								Stage/Days of Accelerated Ageing (S)						
Treatment	**%**	**0**	**15**	**30**	**45**	**60**	**Mean**	**0**	**15**	**30**	**45**	**60**	**Mean**
T1	Control	100	100	70	60	40	74.00	100	100	72	62	40	74.80
T2	5	100	100	70	60	40	74.00	100	100	72	62	40	74.80
T3	10	100	100	70	60	42	74.40	100	100	72	62	42	75.20
T4	20	100	100	72	62	44	75.60	100	100	74	63	43	76.00
T5	30	100	100	76	64	59	79.86	100	100	77	63	60	80.00
T6	40	100	100	78	70	68	83.20	100	100	80	76	69	85.00
T7	50	100	100	82	78	76	87.20	100	100	81	77	76	86.86
T8	60	100	100	86	82	78	89.20	100	100	88	84	76	89.60
T9	70	100	100	90	82	78	90.00	100	100	91	84	76	90.20
T10	80	100	100	90	82	78	90.00	100	100	92	84	76	90.46
T11	90	100	100	90	82	78	90.13	100	100	92	84	76	90.40
T12	100	100	100	90	82	78	90.13	100	100	92	84	76	90.40
	Mean	100	100	80.3	72	63.3		100	100	81.9	73.7	62.5	

C.D (P=0.05) Treatment = 0.80 Stage = 0.51 T x S = 1.79 C.D (P=0.05) Treatment = 0.82 Stage = 0.53 T x S = 1.85

Table 2: Effect of latex - mixture on seedling length (cm) in two black gram varieties T-9 and PU-19 (seeds during accelerated ageing were stored in sealed glass bottles)

T-9								PU-19						
Stage / Days of Accelerated Ageing (S)								Stage/Days of Accelerated Ageing (S)						
Treatment	**%**	**0**	**15**	**30**	**45**	**60**	**Mean**	**0**	**15**	**30**	**45**	**60**	**Mean**
T1	Control	20.80	19.7	15.9	7.7	5.0	13.8	20.6	19.8	16.0	8.0	60	14.2
T2	5	20.8	20.0	16.0	7.9	5.8	14.1	20.6	19.8	16.1	8.4	7.0	14.4
T3	10	20.8	19.8	16.1	7.9	5.9	14.1	20.4	19.9	16.2	8.5	7.2	14.4
T4	20	21.0	19.9	16.3	8.7	8.2	14.8	21.2	21.0	16.4	10.3	7.3	15.7
T5	30	21.0	20.4	18.3	9.8	8.6	15.6	21.2	21.0	18.7	10.5	9.5	16.2
T6	40	21.0	20.4	18.7	10.8	10.2	16.2	21.2	20.8	18.7	11.7	9.9	16.6
T7	50	21.0	20.6	18.7	13.9	12.6	18.0	21.4	20.9	19.1	14.4	10.7	18.2
T8	60	21.1	20.8	19.0	15.6	14.7	18.2	21.4	21.1	19.3	16.2	15.5	18.7
T9	70	20.9	20.8	19.4	15.7	14.8	18.3	21.4	20.7	19.4	16.2	15.8	18.7
T10	80	21.2	20.8	19.1	15.9	14.8	18.3	21.4	21.1	19.4	16.3	15.9	18.8
T11	90	20.9	20.8	19.1	15.9	14.8	18.2	21.4	21.1	19.4	16.3	15.9	18.8
T12	100	21.2	20.8	19.1	15.9	14.8	18.3	21.4	21.1	19.4	16.3	15.9	18.8
	Mean	21.0	20.4	17.9	12.1	11.1							

C.D (P=0.05) Treatment = 0.53 Stage = 0.34 T x S = 1.20 C.D (P=0.05) Treatment = 0.56 Stage = 0.36 T x S = 1.25

Table 3: Effect of latex - mixture on vigor index in two black gram varieties T-9 and PU-19
(seeds during accelerated ageing were stored in sealed glass bottles)

T-9							PU-19						
Stage / Days of Accelerated Ageing (S)							Stage/Days of Accelerated Ageing (S)						
Treatment	**%**	**0**	**15**	**30**	**45**	**60**	**Mean**	**0**	**15**	**30**	**45**	**60**	**Mean**
T1	Control	2080.0	1970.0	1115.5	462.20	200.30	1165.60	2066.6	1980.0	1152.2	496.60	280.20	1195.10
T2	5	2080.0	2003.0	1120.1	474.20	232.30	1182.00	2066.6	1980.0	1159.8	521.00	288.20	1203.10
T3	10	2080.0	1980.0	1127.5	474.10	248.20	1181.90	2076.6	1990.0	1166.5	533.30	307.00	1214.70
T4	20	2100.0	1990.0	1174.0	539.90	360.90	1232.90	2120.0	2100.0	1214.0	649.10	413.10	1299.30
T5	30	2100.0	2040.0	1390.9	627.50	532.70	1338.20	2120.0	2100.0	1440.5	662.00	579.30	1380.30
T6	40	2106.0	2040.0	1458.7	756.20	693.80	1411.00	2130.0	2080.0	1496.2	889.40	738.50	1466.80
T7	50	2120.0	2060.0	1533.9	1084.4	958.20	1551.30	2140.0	2090.0	1537.8	1101.3	942.80	1562.30
T8	60	2120.0	2080.0	1634.6	1279.2	1146.8	1652.10	2140.0	2110.0	1698.6	1361.2	1201.10	1702.10
T9	70	2086.0	2080.0	1719.2	1287.7	2154.4	1665.60	2140.0	2110.0	1765.6	1360.9	1208.60	1717.10
T10	80	2120.0	2080.0	1719.3	1304.3	1164.9	1675.60	2140.0	2110.0	1785.4	13639	1213.70	1723.70
T11	90	2086.0	2080.0	1719.5	1304.2	1167.9	1671.50	2140.0	2110.0	1784.9	1369.4	1209.10	1722.60
T12	100	2120.0	2080.0	1719.1	1303.5	1165.0	1677.50	2140.0	2110.0	1784.1	1369.4	1208.80	1722.60
	Mean	2100.0	2040.0	1452.7	908.10	1026.2		2118.3	2072.5	1698.9	973.60	799.20	

C.D (P=0.05) Treatment = 31.21 Stage = 42.89 T x S = 56.24

C.D (P=0.05) Treatment = 34.91 Stage = 22.53 T x S = 78.06

Table 4: Effect of latex - mixture on speed of germination in two black gram varieties T-9 and PU-19
(seeds during accelerated ageing were stored in sealed glass bottles)

T-9							PU-19						
Stage / Days of Accelerated Ageing (S)							Stage/Days of Accelerated Ageing (S)						
Treatment	**%**	**0**	**15**	**30**	**45**	**60**	**Mean**	**0**	**15**	**30**	**45**	**60**	**Mean**
T1	Control	68.57	64.28	50.32	40.36	27.56	50.22	67.47	64.57	51.41	40.48	28.20	50.43
T2	5	68.57	64.35	50.46	40.38	27.58	50.27	67.48	64.57	51.42	40.48	28.36	50.46
T3	10	68.57	65.17	52.24	42.47	30.26	51.74	67.46	64.60	51.49	41.22	31.24	51.20
T4	20	68.58	66.38	54.18	43.12	34.42	53.33	67.40	65.28	52.46	43.34	35.18	52.73
T5	30	68.58	67.18	56.22	44.36	37.18	54.70	67.38	65.42	52.82	47.14	37.24	54.00
T6	40	68.54	67.32	56.29	47.18	39.36	55.73	67.54	66.14	56.34	52.18	39.28	56.29
T7	50	68.56	67.46	57.14	49.24	41.56	56.77	67.47	66.23	57.22	52.18	40.32	56.68
T8	60	68.58	67.52	57.40	49.51	42.19	57.04	67.61	66.42	58.47	53.36	43.58	57.89
T9	70	68.56	67.56	58.18	53.24	43.25	58.16	67.82	66.47	58.49	54.22	44.12	58.22
T10	80	68.57	67.49	58.19	53.26	43.25	58.15	67.57	66.47	59.12	54.22	44.17	58.31
T11	90	68.58	67.56	58.19	53.26	43.27	58.17	67.58	66.47	59.12	54.23	44.19	58.32
T12	100	68.58	67.56	58.19	53.29	43.27	58.18	67.58	66.48	59.13	54.24	44.19	58.32
	Mean	68.57	66.65	55.58	47.47	37.75		6753	65.76	55.62	48.94	38.34	

C.D (P=0.05) Treatment = 0.25 Stage = 0.16 T x S = 0.56

C.D (P=0.05) Treatment = 0.53 Stage = 0.34 T x S = 1.20

Thus, our studies reveal that both the varieties of black gram are susceptible to accelerated ageing, hence seed treatment with latex-mixture is required for its seed storage so as to avoid losses. The treatment with latex-mixture is very beneficial to protect seeds from damage caused by high temperature and high humidity, thereby retaining their viability, vigor and seedling growth.

References

1. Chandrasenan Nair V. Effect of provenance on seed quality and halogenation treatment to control seed deterioration in rice M.Sc. (Agri.) thesis Tamil Nadu Agricultural University Coimbatore, 1996.
2. Garg MK, Premi CL, Gupta SR. Factors affecting seed viability during storage Seed Sci. & Technol. 1988; 41:206-214.
3. ISTA. International rules for seed testing Seed Sci. and Technol. 1993; 3:322-214.
4. Abdul-Baki AA, Anderson JB. Vigour determination in soybean seed by multiple criteria. Crop Sci. 1973; 13(6):630-633.
5. Kumari Anita, Kohli RK. Studies on dormancy and macromolecular drifts during germination in *Cassia occidentalis* L. Tree Sci. 1984; 3:111-125.
6. MIR PA, Singh Dhirendra, Tickoo JL, Vari AK. Effect of pre sowing seed treatment with growth regulators on germination and vigour in mungbean. Seed Res. 2005; 33(2):134-137.
7. Abdul-Baki AA, Baker JE. Are changes in cellular organelles or membranes related to vigour loss in seed. Seed Sci. and Technol. 1973, 89-125.
8. Osborne DJ, Roberts BE, Payne PI, Sen S. Protein synthesis and viability in RYE embryos and mechanism of regulation of plant growth *Royal Society* New Zealand, 1974, 805-818.