Journal of Pharmacognosy and Phytochemistry

Available online at www.phytojournal.com

E-ISSN: 2278-4136
P-ISSN: 2349-8234
JPP 2019; 8(6): 252-255
Received: 12-09-2019
Accepted: 16-10-2019

Rekha Patil
Department of Seed Science and Technology, College of Agriculture, University of Agricultural Sciences Dharwad, Karnataka, India

Ravi Hunje
Department of Seed Science and Technology, College of Agriculture, University of Agricultural Sciences Dharwad, Karnataka, India

G Somanagouda
Department of Agronomy, College of Agriculture, University of Agricultural Sciences Dharwad, Karnataka, India

SS Chadrashekhar
Department of Seed Science and Technology, College of Agriculture, University of Agricultural Sciences Dharwad, Karnataka, India

Corresponding Author:
Rekha Patil
Department of Seed Science and Technology, College of Agriculture, University of Agricultural Sciences Dharwad, Karnataka, India

Influence of seed enhancement techniques on seed quality in onion (*Allium cepa* L.)

Rekha Patil, Ravi Hunje, G Somanagouda and SS Chadrashekhar

Abstract
The experiment was carried out at Seed Quality and Research Laboratory, Seed Unit, University of Agricultural Sciences, Dharwad to study the effect of seed enhancement techniques on seed quality in onion. Seed quality parameters were significantly influenced between the seed lots and seed enhancement techniques. Fresh seed lot (L_1) recorded significantly higher germination (89.56 %), root length (8.63 cm), shoot length (11.14 cm), seedling vigour index (1773), as compared to old seed lot (L_2) 86.44%, 8.28 cm, 10.67 cm, 1640 respectively. While encrusting with Thiram: Genius coat (1:1.2) (T_4) recorded significantly higher germination (91.50%), root length (9.11 cm), shoot length (11.62 cm), seedling vigour index (1897) and lowest was recorded in control (T_6) 84.83%, 8.05 cm, 10.33 cm, 1559 respectively therefore encrusting with Thiram: Genius coat (T_4) (1:1.2) can be used in order to enhance the seed quality of onion var. Bhima Super.

Keywords: Onion, seed quality enhancement techniques, germination

Introduction
Onion (*Allium cepa* L.) is one of the major bulb crops of the world and important commercial vegetable grown all over the world and occupies a premier position amongst the vegetables due to its high preference in food, remunerative price and regular demand in the market. Worldwide onion is grown on 49.60 lakh ha area with 931.70 lakh MT production and productivity of 18.80 MT ha $^{-1}$ (Anon., 2018) [4]. Major onion growing states in India are Maharastra, Karnataka, Madyapradesh, Rajasthan, Bihar, Odisha and Gujarat. Karnataka occupies the second position in area (1.95 lakh ha) and third position in production (29.87 lakh MT).

Major problem in onion is low quality seeds resulting in slow and asynchronous germination as well as seeds producing a high number of abnormal seedlings (Borowski and Michałek, 2006) [6]. Seedling establishment is an important factor in bulb production of onion, it largely depends on the seed germination and vigour. Onion seeds are small in size, irregular in shape hence difficult in singling resulting difficulty in sowing and ultimately crop establishment. Seed enhancement techniques like film coating and encrusting help in giving uniform size, singling seed and facilitate better sowing. Thus helps to reduce emergence time, accomplish uniform emergence and give better crop stand (Ashraf and Foolad, 2005) [5].

Keeping in view of the above facts, the present investigation was carried with an objective to find out the effect of seed enhancement techniques seed quality of onion.

Material and Methods
The laboratory experiment was carried out at Seed Quality and Research Laboratory of National Seed Project (Crops) Seed Unit University of Agricultural Sciences, Dharwad, to know the effect of seed enhancement techniques on seed quality of fresh and old seed lot (seed stored in cold storage for one year). The experiment involved two seed lots as one factor and seed enhancement techniques as second factor. The experiment was conducted in a factorial Completely Randomized Block Design. Both fresh and old seed lot were subjected to six seed enhancement treatments. Following seed treatments were employed by Incotec company with T_1- Film coating (Disco product- I), T_2- Film coating (Disco product-II), T_3- Encrusting (Thiram: Mycorrhiza (1:1.2), T_4-Encrusting (Thiram: Genius coat 1:1.2), T_5- Encrusting (Thiram: Nanonutrient (1:1.2), T_6-Control. Laboratory observations on seed germination percentage, seedling length and seedling dry weight was assessed as per the standard procedures (Anonymous, 2014), seedling vigour index (Abdul-Baki and Anderson, 1973), were recorded. The data obtained were analysed for 'F' test of significance following the methods described by Panse and Sukhatme (1985) [18]. The critical differences (CD) were calculated at 1 per cent probability level.

Result and Discussion

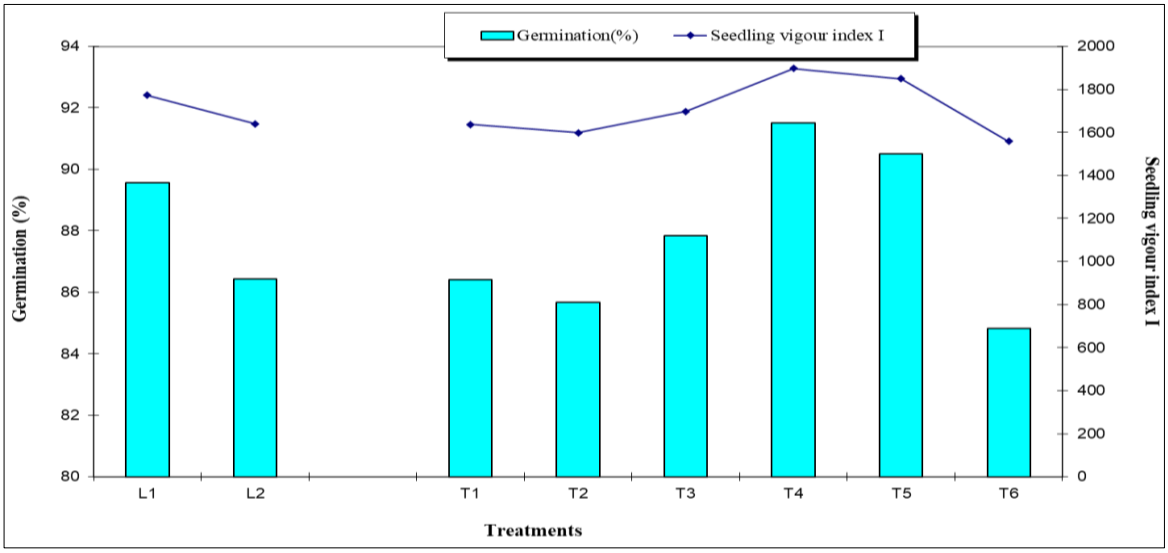
The data on seed quality parameters were significantly influenced by seed lots and seed enhancement techniques but their interaction did not differ significantly.

Between the seed lots, fresh seed lot recorded significantly higher seed quality parameters compared to old seed lot. Fresh seed lot (L_1) recorded significantly higher germination (89.56 %), as compared to old seed lot (L_2) 86.44%, Above results are in agreement with various workers in different crops such as okra (Narwal, 1995) [17], Indian mustard (Verma *et al.*, 2003) [23], carrot (Maskri *et al*., 2003) [16], turnip (Khan *et al.*, 2005) [10] and in four vegetables seed (carrot, cucumber, onion and tomato) by Alhamdan *et al.* (2011) [2]. Higher root length (8.63 cm), shoot length (11.14 cm), was recorded in fresh seed lot as compared to old seed lot (L_2) indicating 8.28 cm, 10.67 cm, Similar findings were also reported in fenugreek by Kumari *et al.* (2014) [12], Singh *et al*. (2015) [22], in coriander by Deshraj (2002) [7], Kumar (2007) [11] and in turnip by Khan *et al.* (2005) [10]. Maximum value for seedling vigour index (1773) was recorded in fresh seed lot compared to old seed lot (1640). The present results are similar with the findings of Kumar *et al*. (2015) [13] in coriander. Fresh seed lot recorded highest seedling dry weight (28.36 mg) as compared to old seed 26.72 mg, respectively. These observations were similar with reported by Singh *et al*. (2015) [22] in fenugreek. The lower seed quality parameters of old seed lot might be due to ageing in old seed lot resulted in low seed vigour and initial slow growth rate which ultimately caused the slower ontogenetic development of seedling (Heydecker, 1973) [9]. In findings of Ravinder (1990) [20] and Krishna (1993) [14] on sunflower crop, in fresh seed lot higher enzymatic activities, vigour and better performance might be due to changes in ribonucleic acids which increased enzymatic activity in fresh seeds as reported by Sanjaykumar (1996) [21] and similar result was reported by Pushpalatha (2008) [19] in okra. Seed enhancement techniques had greater influence on seed quality parameters. (Table 1). Among the seed enhancement techniques T_4 [Encrusting (Thiram:Genius coat 1:1.2] recorded significantly highest seed germination (91.50%), root length (9.11 cm), shoot length (11.62 cm), seedling vigour index (1897), seedling dry weight (30.00 mg) and it was on par with treatment having seed encrusting of Thiram: Nanonutrient (T_5) germination (90.50 %) root length (9.11 cm), shoot length (11.50 cm), seedling vigour index (1849), seedling dry weight (29.05 mg), lowest was recorded in control 84.83%, 8.05 cm, 10.33 cm, 1559, 25.89 mg, the seedling length was also found to be higher in seed encrusted treatments as compared to control. It further increased the vigour index computed on basis of germination and seedling length. Almost similar types of observations have been reported in vegetable seeds (Li Ming, 2005) [15]. The present results are in accordance with findings of Yadav (2018) [24] in mustard crop. This may be due to its active ingredient boosts crop nutrition and stimulates root development by nurturing the seed and a chain reaction is triggered that reinforces the entire growth period thus helps in increasing the seed quality parameters as reported by Gelta (2019) [8] in chickpea. However, the seed quality parameters did not differ significantly due to interaction between seed lots and seed enhancement techniques. (Table 1).

Table 1: Influence of seed enhancement techniques on root length, shoot length and seedling dry weight of onion.

Seed lots (L)	Root length (cm)	Shoot length (cm)	Seedling dry weight (mg/10 seedlings)
L_1	8.63	11.14	28.36
L_2	8.28	10.67	26.72
Mean	8.45	10.91	27.48
S.Em. ±	0.03	0.07	0.24
C.D. @1%	0.12	0.29	0.97
Treatments (T)			
T_1	8.23	10.65	26.77
T_2	8.16	10.50	26.27
T_3	8.26	10.83	27.25
T_4	9.11	11.62	30.00
T_5	8.93	11.50	29.05
T_6	8.05	10.33	25.89
Mean	8.45	10.91	27.48
S.Em. ±	0.05	0.13	0.42
C.D. @1%	0.21	0.50	1.38
Interaction (L×T)			
L_1T_1	8.31	10.95	27.81
L_1T_2	8.28	10.60	27.33
L_1T_3	8.41	11.19	28.04
L_1T_4	9.35	11.88	31.00
L_1T_5	9.26	11.70	29.15
L_1T_6	8.20	10.53	26.85
L_2T_1	8.15	10.35	25.73
L_2T_2	8.04	10.40	25.22
L_2T_3	8.12	10.48	26.48
L_2T_4	8.87	11.36	29.00
L_2T_5	8.61	11.30	28.96
L_2T_6	7.90	10.14	24.93
Mean	8.45	10.91	27.48
S.Em. ±	0.08	0.18	0.60
C.D. @1%	NS	NS	NS

L_1- Fresh seed lot
L_2- One year old seed lot (cold storage)
T_1- Film coating with Disco Product-I
T_2- Film coating with Disco product-II
T_3-Encrusting with Thiram: Mycorrhiza (1:1.2)
T_4-Encrusting with Thiram: Genius coat (1:1.2)
T_5- Encrusting with Thiram: Nano-nutrient (1:1.2)
T_6- Control
NS: non-significant



L_1- Fresh seed lot
L_2- One year old seed lot (cold storage)
T_1- Film coating with Disco Product-I
T_2- Film coating with Disco product-II
T_3-Encrusting with Thiram: Mycorrhiza (1:1.2)
T_4-Encrusting with Thiram: Genius coat (1:1.2)
T_5- Encrusting with Thiram: Nanonutrient (1:1.2),
T_6- Control.

Fig 1: Effect of seed lots and seed enhancement techniques in germination and vigour index I

Conclusion

It can be concluded that encrusting with Thiram: Genius coat (T_4) (1:1.2) has showed better effect in improving all the seedling characters studied in both the fresh and aged seed lots over the control and also helps in enhancing the seed quality parameters in onion.

References

1. Abdul-Baki AA, Anderson JD. Vigour determination of soybean seeds by multiple criteria. Crop Sci. 1973; 13:630-633.
2. Alhamdan AM, Alsadon AA, Khalil SO, Wahb-Allah MA, Nagar MEl, Ibrahim AA. Influence of storage conditions on seed quality and longevity of four vegetable crops. American-Eurasian J Agril and Env. Sci. 2011; 11(3):353-359.
3. Anonymous. International Rules for Seed Testing. Seed Sci. Technol, 2014, 27-125.
4. Anonymous. Horticulture statistics division, Department of Agriculture and Co-operation and Farmers Welfare, Ministry of Agriculture and Farmers Welfare, Govt. of India, New Delhi. Annu. Rep, 2018, 512.
5. Ashraf M, Foolad MR. Pre-sowing seed treatment-a shotgun approach to improve germination growth and crop yield under saline and non-saline conditions. Adv. Agron. 2005; 88:223-271.
6. Borowski E, Michałek S. The effect of seeds conditioning on emergence and early growth of onion and carrot seedlings. Annales Universitatis Mariae Curie-Skolodowska Section EEE, Horticultura. 2006; 16:119-129.
7. Deshraj. Studies on viability and vigour in coriander (*Coriandrum sativum* L.). M.Sc. Thesis, submitted to CCS HAU, Hisar, 2002.
8. Geleta T. Effect of seed coating substance (Genius Coat Disco Cereal AG L-439) on seed yield and yield component of chickpea (*Cicer arietinum* L.) in central highlands of Ethiopia. J Agric. Biotech. Sustain. Dev. 2019; 11(1):1-5.
9. Heydecker W. Interrelated effects of inhibition, temperature and oxygen on seed germination. In: Seed Ecology (Ed. W. Heydecker, Butterworth), London, 1973, 157-169.
10. Khan MM, Iqbal MJ, Abbas M. Loss of viability correlates with membrane damage in aged turnip (*Brassica rapa*) seeds. Seed Sci. and Technol. 2005; 33(2):517-520.
11. Kumar A. Seed quality assessment in naturally aged seeds of coriander (*Coriandrum sativum* L.). M.Sc. Agri. Thesis, submitted to CCS HAU, Hisar. 2007.
12. Kumari S, Kumar A, Tehlan SK. Studies on physiological parameters in fenugreek under ambient conditions. Annals of biology. 2014; 30(4):691-695.
13. Kumar V, Verma SS, Verma U, Kumar A. Seed viability and vigour in naturally aged seeds of coriander (*Coriandrum sativum* L.). Ind. J Agric Sci. 2015; 85(4):561-565.
14. Krishna A. Influence of vigour levels on field emergence, growth and yield performance of sunflower hybrids (*Helianthus annuus* L.). M.Sc. (Agri.) Thesis, Univ. Agric. Sci., Bangalore, Karnataka (India), 1993.
15. Li Ming, Yao Dongwei, Wan Li. Effects of encrustation on germination and seedling growth of vegetable seeds. Shanghai Nongye Xuebao. 2005; 21(3):17-20.
16. Maskri AI, Khan AY, Khan IA, Habri K. Effect of accelerated ageing on viability, vigour (RGR) lipid peroxidation and linkage in carrot (*Daucus carrot* L.) seeds. Int. J Agric. and Biol. 2003; 5(4):580-584.
17. Narwal AK. Studies on seeds viability of okra (*Abelmaschus esculentus* L. Moench.). Ph.D. Thesis, Univ., Agric. Sci., Hisar, Haryana, 1995.
18. Panse VG, Sukhatme PV. Statistical methods for agricultural workers, ICAR, New Delhi, 1985, 167-174.
19. Pushpalatha BT. Effect of seed priming on storability and field performance in okra (*Abelmoschus esculentus* (L.) Moench). M.Sc. (Agri.) Thesis, Univ. Agric. Sci., Dharwad, (Karnataka) India, 2008.
20. Ravinder V. Studies on the effect of accelerated ageing on germination, vigour and yield of sunflower (*Helianthus annuus* L.) M.Sc. (Agri.) Thesis, Andhra Pradesh Agric. Univ., Hyderabad, AP, (India), 1990.

21. Sanjaykumar, Poonam Singh RP, Katiyar CP, Khan AA. Beneficial effect of some plant growth regulators on aged seeds of okra (*Abelmoschus esculentus* (L.) Moench.) Under field conditions. Veg. Sci. 1996; 4(2):212-216.
22. Singh B, Bhuker A, Mor VS, Dahiya OS, Punia RC. Seed quality assessment in naturally aged seed of fenugreek (*Trigonella foenumgraecum* L). International J Sci. Res. in Sci. and Technol. 2015; 1(4):243-248.
23. Verma SS, Verma U, Tomer RP. Studies on seed quality parameters in deteriorating seeds in brassica (*Brassica campestris*). Seed Sci. and Technol. 2003; 31:389-396.
24. Yadav RD. Influence of seed encrustation on germination, establishment and seed yield in rapeseed mustard. Int. J Curr. Microbiol. App. Sci. 2018; 7:3539-3541.