

Short Communication

Occurrence of “fish mouth” seeds in hot pepper (*Capsicum annum* L.) and its effect on the seed quality

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Hot pepper (*Capsicum annum* L.) sometimes contains seeds with split coats. These expanded seeds are often referred to as “fish mouth” seeds, because the split seed coat resembles an open fish’s mouth when viewed longitudinally. “Fish mouth” seeds are live seeds and are normal as good seeds. The cause of occurrence of these seeds is varietal character and usually such varieties or inbred lines are classified as difficult to produce (DTP). Also there are some reports suggest that the occurrence of such seeds related to ageing of seed or delayed harvesting or decaying (Welbaum 1992). This seed shape is classified as circular with fish mouth and have archaeological significance (Dillehay *et al.*, 2012). The “fish mouth” seeds with commonly found in modern varieties derived from *Capsicum chinense* L. (Pickersgill, 1969). These seeds with split seed coat pose problem for seed treatment since there is a possibility of injury to embryo inside the seed due to polymers and fungicides at the time of imbibition.

Seeds of inbred line no- OPT136459 (coded) were obtained from fresh commercial harvest in 2012 (Optima Seeds, Davanagere, Karnataka) and are evaluated individually for the presence of split seed coat or “fish mouth” seeds using Leica Microscope EZ4. To know the effect of polymer and fungicide seed treatment on seed quality, the split seed coat seeds were then treated with recommended doses of polymer (Disco Agro SP Red-L200, Incotec, Ahmadabad @ 20 ml/kg) and fungicides (Carbendazim @ 2g/kg-Bavistin™). For treating seeds automatic seed treater (Reliance Auto-ST) was used and seeds were dried in dryer (BryAir™). The seeds treated with only polymer, polymer with fungicide, only fungicide and no treatment.

The seeds were subjected to tetrazolium test to know the viability of seeds where the living tissues reduce

colourless solution of 2-3-5- triphenyl tetrazolium chloride into red coloured compound called Formazan (2-3-5-triphenyl formazan). The seeds with less or no staining considered as dead. Also tested for various seed quality parameters such as germination, rate of germination, mean germination time, mean daily germination, peak value, germination value, emergence rate index, root length, shoot length and seedling vigour index as per the rules of International Seed Testing Association (1985). The data generated statistically analysed with completely randomised design.

Among the different treatments, first treatment where split seeds treated with polymer (Fig.1) produced almost pre-germinated seeds with radicle imbibed enough to come out of the seed. There is no injury to the embryo in this case. In second and third treatments where seeds treated with polymer+fungicide and only fungicide caused lot of injury to the embryo which is evident from necrotic-unstained spots appeared all over the embryo (Fig.2 &3). In the fourth treatment, the viability test show no injury to the embryo and seeds are highly vigorous (Fig.4).

The results of other seed testing methods to know the effect on various seed quality attributes were presented in table-1. The seeds with no treatment either with polymer or fungicide recorded highest germination (89%), rate of germination (13.0), mean germination time (45.57), mean daily germination (6.36), peak value (1.56), germination value (9.43), emergence rate index (3.34), root length (11.68 cm), shoot length (5.63 cm) and seedling vigour index (1541).

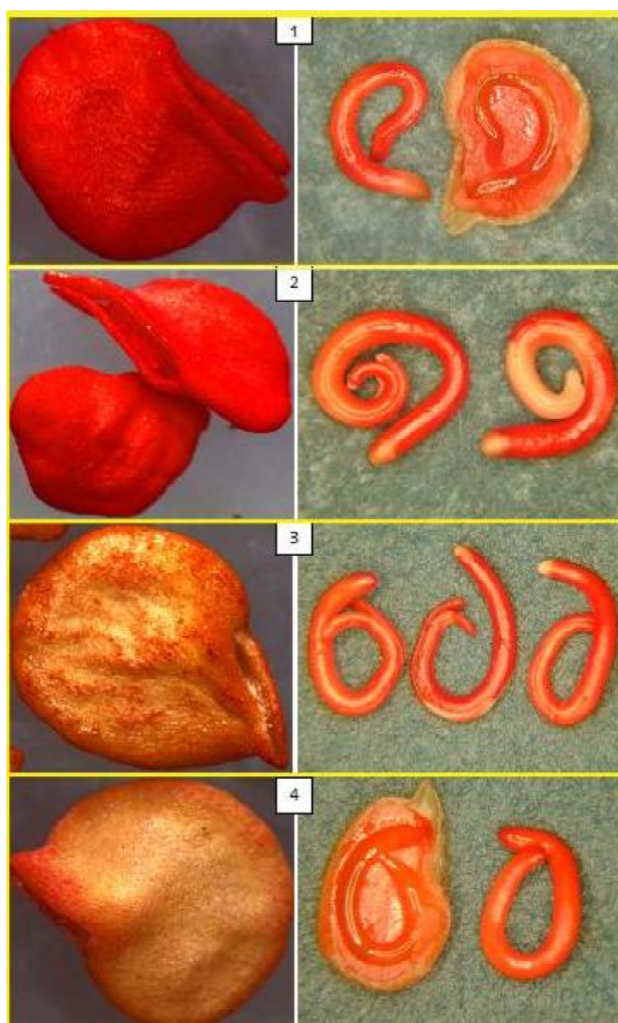
The seeds treated with polymer alone also recorded better germination (81%), but the other treatments with polymer and fungicides recorded lowest seed quality attributes. This shows the seeds with split seed coats or “fish mouth” seeds need no treatment or only with inert polymer.

The “fish mouth” seeds which have split seed coats will

Table 1: Effect of split seed coat (“fish mouth”) on seed quality in *Capsicum annum* L.)

Treatments	GE (%)	RoG	MGT	MDG	PV	GV	ERI	RL (cm)	SL (cm)	SVI
T-1:Polymer	81	11.3	43.86	5.79	1.16	6.79	3.13	9.62	4.58	1150
T-2:Polymer+Fungicide	73	10.2	39.21	5.21	1.17	6.17	2.92	9.96	4.57	1061
T-3:Fungicide	76	11.1	38.93	5.43	1.26	7.02	2.93	10.36	4.89	1159
T-4:No Treatment	89	13.0	45.57	6.36	1.56	9.43	3.34	11.68	5.63	1541
Sem ±	0.69	0.05	0.12	0.07	0.02	0.06	0.03	0.05	0.04	2.49
CD (P=0.05)	1.97	0.15	0.35	0.21	0.07	0.18	0.07	0.15	0.1	7.08

GE %- Germination; RoG- Rate of Germination ; MGT-Mean Germination Time; MDG- Mean Daily Germination; PV-Peak Value; GV- Germination Value; ERI-Emergence Rate of Index; RL (cm)- root Length; SL (cm)- Shoot Length; SVI- Seedling Vigour Index

**Figure 1:** Tetrazolium test of hot pepper seed with split seed coat

1. Left- Seeds treated with polymer only; Right- Pre-germinated seed
2. Left- Seeds treated with polymer and chemical; Right- Dead root tips and embryo
3. Left- Seeds treated with chemical only; Right- Necrotic root tip
4. Left- Seeds treated with no polymer and chemicals; Right- Healthy and vigorous seed

expose the embryo higher imbibition and if any chemical come in to contact with this may cause injury to the tissue. Similar results were observed by Martin (1946). Chen and Lott (1992) earlier reported that the embryo stores most of the protein required for germination and lipid in endosperm which may result in early prompting of germination when treated with polymer. Also endosperm which acts as store of mannan containing polysaccharides which are required for the radicle to emerge out of seed will come in to contact early when there is split seed coat (Watkins *et al.*, 1985). This may be the reason for pre-germination when treated with polymer alone. Polymer is an inert material which has no detrimental effect on the embryo. But when treated with fungicides will have detrimental effect because of hazardous nature of these chemicals on living tissue. Bosland and Votava (2012) deduced that correct stage harvesting when the endosperm is fully developed may reduce the effect of split seed coat on seed quality. The seeds with split seed coat or “fish mouth” seed must not treated with and fungicides and even inert polymers. The seed quality can be maintained if packed as naked seed only.

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