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Short Communication

Ascertaining Quality of Seed Lot of *Albizia chinensis* using X-rays Radiography

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Albizia chinensis is a social forestry tree. It provides fuel, fodder and is used in manufacture of packing cases for tea. Being leguminous with wide range of utilization, it is increasingly used as a preferred species in large scale afforestation of wastelands. This requires large amount of seeds of high quality. To avoid failure of nursery, prior testing of the seed lots is required. The time crunch in such large scale afforestations do not favour complete germination test. X-ray radiography offers a non-destructive quick estimation of seed viability and quality. The application of X-ray radiography in seed science is one of the few technologies that originated with tree seeds instead of agriculture seeds. Radiography was first used to determine seed quality over 100 years ago [1]. The earlier studies highlighted the X-ray technique as a diagnostic method of tree seed analysis [2]. ISTA has accepted X-ray radiographic method as a valid alternative to the cutting test for the detection of empty and insect damaged seeds. It also shows considerable promise for distinguishing viable and .non-viable seeds among full seeds [3]. The technique is more important in those species whose seeds are rare and costly and where we cannot spare the seeds for cutting or germination tests.

The seeds were collected from in and around the university of Horticulture and Forestry campus at Nauni, Solan. Seeds were collected at six different dates, at 10 days intervals, viz., December 15, December 26, January 06, January 17, January 28 and February 08. Four replication of 100 seeds each, from each collection dates, were taken for X-ray examination. Seeds were placed in movable platform of X-ray Seed Scanner machine operated by remote control device. Seeds during scanning were individually viewed on a T.V. monitor screen attached with the X-ray Seed Scanner machine to detect empty and immature seeds, insect damaged and abnormally developed internal seed structure present in different seed lots. On the basis of monitoring seeds on screen of X-ray Seed Scanner, seeds were categorized into four classes viz., normal, immature, insect infested and abnormal. Seeds of each class were kept separately for germination studies in the germinator. For germination the categorized seeds were placed on blotting paper in Petri dishes which were kept moist. The blotting paper along with the seeds were placed in germinator at 30°C temperature. Those seeds having radical of 5 mm or longer were counted as germinated. The experiment was terminated after 28 days.

It was observed that seed lots collected at different collection dates and then graded on the basis of X-ray examination were having maximum (90.25%) normal seeds in November, 28 collection which differed significantly with all other

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collections. The least (31.25%) of normal seeds were observed in seeds collected on December, 15. The X-ray scanning showed that immature seeds were maximum (68.75 %) in first collection which was followed by second collection by observing a value of 45.75 % which differed significantly with each other and with other collections (Table 1). The least (2.0 %) immature seeds were found in last collection i.e., on February, 08 which was at par with the collection made on January, 28. Neither insect infested nor abnormal seeds were observed when collected on December, 15, however, it was maximum 8.00 and 3.25 per cent respectively in last collection date i.e., February, 08.

Corresponding value for germination of all categories of X-ray scanned seeds is given in Table 1. The data revealed that germination was highest 66.50 per cent and least 13.25 per cent in normal seeds. Whereas, germination of immature seeds decreased and became zero in last two collections. The germination of insect infested and abnormal seeds was very less. It was only 1.75 per cent (insect infested) in seeds collected on February, 08, whereas, germination showed non-significant difference in abnormal seeds. The results showed that seeds harvested on first collection i.e., December, 15 possessed significantly higher percentage of immature seeds that indicated physiological immaturity of the seeds. Substantial amount of immature seeds were present upto fifth collection as indicated by its percentage and corresponding germination per cent. The percentage of normal seeds decreased in collection after January, 28 due to increase in percentage of insect infested and abnormal seeds. Similarly, a good correlation between the development class of seeds of *Pinus sylvestis* and *Picea abies*, based on the development of both embryo and endosperm and their germinability was found [4]. In other study, X-ray radiography technique was used to determine the proportion of filled seed of Jack pine collected on different

Table 1. X-ray classes and corresponding germination during maturation of *Albizia chinensis* seeds

Collection date	Percentage of seeds in different classes				Mean Germination (%)			
	Normal	Immature	Insect infested	Abnormal	Normal	Immature	Insect infested	Abnormal
December, 15	31.25 (33.97)*	68.75 (56.03)	0.00 (1.00)	0.00 (1.00)	13.25 (21.30)	1.50 (1.57)	0.00 (1.00)	0.00 (1.00)
December, 26	53.00 (46.72)	45.75 (42.56)	0.00 (1.00)	1.25 (1.49)	35.00 (36.26)	1.25 (1.49)	0.00 (1.00)	0.00 (1.00)
January, 06	74.50 (59.72)	23.75 (29.12)	0.00 (1.00)	1.75 (1.65)	51.50 (45.86)	0.75 (1.31)	0.00 (1.00)	0.25 (1.10)
January, 17	84.25 (66.71)	11.50 (19.68)	2.25 (1.80)	2.00 (1.72)	61.00 (51.36)	0.25 (1.10)	0.25 (1.10)	0.25 (1.10)
January, 28	90.25 (71.83)	3.25 (10.37)	4.00 (2.23)	2.50 (1.87)	66.50 (54.64)	0.00 (1.00)	1.00 (1.41)	0.50 (1.21)
February, 08	86.75 (68.66)	2.00 (7.99)	8.00 (3.00)	3.25 (2.06)	60.00 (51.06)	0.00 (1.00)	1.75 (1.65)	0.50 (1.21)
S.E. m±	1.51	1.58	0.08	0.11	1.01	0.12	0.07	NS
$C.D_{0.05}$	3.23	3.37	0.16	0.24	2.15	0.25	0.15	-

Notes: *Values in parenthesis are transformed values; NS= Non-significant

dates during maturation and reported that X-ray radiography gives positive signal of quality of seed lot [1]. In the present study, the corresponding germination per cent of normal seeds decreased during later stages of maturation i.e., on February, 08 collection which may be ascribed to the impermeability of the testa caused by lignifications, which was associated with maturity as reported in *Tilia americana* seeds [5].

It is evident from the study that the X-ray Seed Scanning is a good method for ascertaining the quality of seed lot. The seeds which were observed to be immature, insect damaged and empty though X-ray scanning showed least germination, whereas, normal seeds showed high germination.

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