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Short Communication

Ascertaining Quality of Seed Lot of *Albizia chinensis* (Osbeck) Merrill using X-ray Radiography

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Albizia chinensis (Osbeck) Merrill is a social forestry tree. It provides fuel, fodder and is used in manufacturing 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 a large amount of seeds of high quality. For successful raising of the nursery of *Albizia*, prior testing of its seeds are required. The time crunch in such large-scale afforestations do not favour complete germination test.

X-ray radiography offers a non-destructive and quick estimation of seed quality. The application of X-ray radiography is one of the few technologies that was originally devised for tree seeds. Radiography was first used to determine seed quality over 100 years ago [2]. The earlier studies also highlighted the X-ray technique as a diagnostic method of tree seed quality testing [3]. 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 [4]. 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 campus at Nauni, Solan. Seeds were collected at six different dates, *i.e.* at 10 days intervals, *viz.* December 15, December 26, January 06, January 17, January 28 and February 08. Four replications of 100 seeds each, from all collection dates, were used for X-ray examination. Seeds were placed on movable platform of X-ray Seed Scanner. Individual seed was viewed (on monitor screen attached with the X-ray Seed Scanner) to detect empty and immature seeds, insect damaged and with abnormal internal seed structures. Seeds were categorized into four classes, *viz.* normal, immature, insect infested and abnormal (Figs 1a-d). Seeds from each class were subjected to germination studies using moist blotting paper in Petri dishes at 30°C. Those seeds having emerged radical of 5 mm or long were counted as germinated. The experiment was terminated on 28 days.

Seed lots registered maximum value (90.25%) for normal seeds in January 28 collections, which differed significantly with all other seed lots. The least value (31.25%) of normal seeds were registered in seeds collected on December 15. Immature seeds were maximum (68.75%) in first collection, which decreased with advancement in the date of collection and were minimum (2.0 %) in last collection, *i.e.* on February 08 (Table 1). No insect infested or abnormal seeds was observed when collected on December 15; however, these were maximum (8.00% and 3.25%, respectively) in last collection date, *i.e.* February 08.

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Corresponding values for seed germination of all categories of seeds is given in Table 1. The data showed that germination was maximum (66.50%) for January 28 (second last date of collection) and minimum (13.25%) for December 15 (first date of collection) in normal seeds. The germination of immature seeds was low (1.50%) and subsequently decreased to zero on last two dates of collections. The germination of insect infested seeds was also very less (1.75%) on February 08 collection. The seeds harvested on first date of collection, *i.e.* December 15 possessed significantly higher percentage of immature seeds that indicated physiological immaturity of seeds. Substantial amount of immature seeds were present up to fifth collection date (January 28) as indicated by its percentage and corresponding germination values. The percentage of normal seeds decreased in collections on January 28 and onwards due to increase in insect infestation and/or 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 reported [4]. In other study, X-ray radiography technique was used to determine the proportion of filled seeds of Jack pine collected on different dates during maturation and its quality [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. Similar work is reported in *Tilia americana* seeds [5].

It is inferred from the study that 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 showed least germination, whereas normal seeds showed higher germination. The normal

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

Date of seed collection	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 (51.060)	0.00 (1.00)	1.75 (1.65)	0.50 (1.21)
SEm ±	1.51	1.58	0.08	0.11	1.01	0.12	0.07	NS
$CD_{0.05}$	3.23	3.37	0.16	0.24	2.15	0.25	0.15	

Values in parentheses are transformed values, NS = non-significant

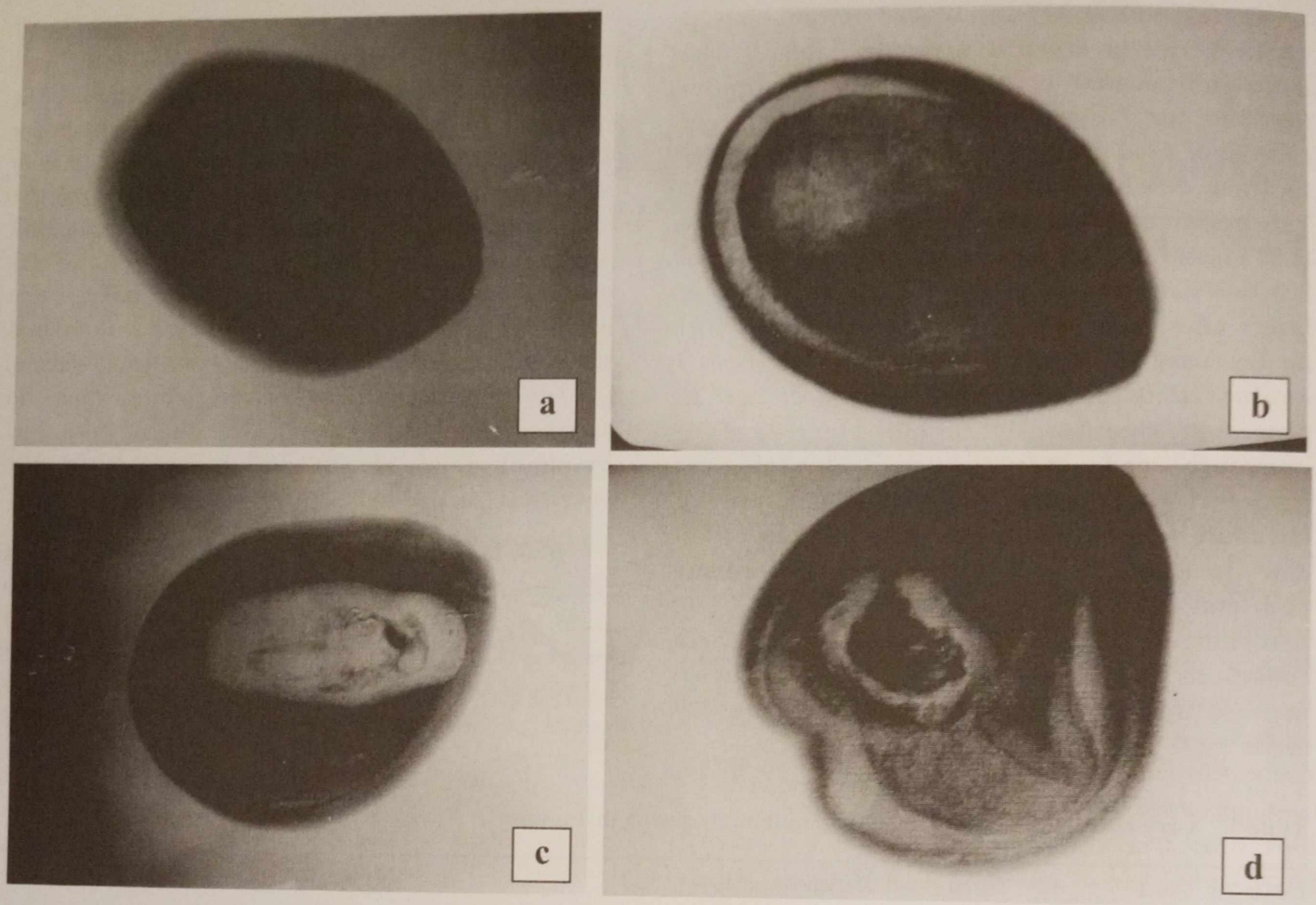

Fig. 1. X-ray seed radiography – quality of *Albizia chinensis* where, a: Normal seed, b: imature seed, c: insect infested seed, d: abnormal seed

seeds using X-ray examination can be separated easily from the seed lot for getting better seed germination in the field.

REFERENCES

1. CEICH, R.A. & T.D. RUDOLPH (1982). Time of Jack pine seed maturity in lake states provenances. *Can. J. For. Res.* **12:** 368-373.

2. LUNDSTORM, A.N. (1903). Diskussionsinglagg vid For. F. Skogsvard disk – Mote a Robertsfor. *Arsskr. Fran Foren. F. Skogsvard I Norrland,* Stockholm, **1994:** 15.

3. SIMAK, M. & A. GUSTAFASSON (1953). X-ray photography and sensitivity in forest tree species. *Hereditas* **39:** 458-468.

4. SIMAK, M. (1980). X-ray radiography in research and testing of forest tree seeds. *Sveriges Lantbruksunivesitet. Institutionen For Skogssketsel* Nr. 3.

5. VASTONE, D.E. & W.G. RONALD (1982). Seed germination of American bass wood in relation to maturity. *Can. J. Pl. Sci.* **62:** 709-713.