

RESEARCH NOTES

(I)

SEED MATURITY INDICES IN KHASI PINE (*PINUS KESIYA*)

Introduction

Pinus kesiya Royle ex Gordon, commonly known as 'Khasi pine', is widespread in South-East Asia between latitudes 10° N - 30° N and longitudes 26° E - 119° E, respectively. In India, it occurs in Khasi and Jaintia Hills of Meghalaya, Arunachal Pradesh, Nagaland and Manipur. *P. kesiya* has substantial place in the plantation programmes of the country and about 2,370 ha area has been planted in North-East India up to the year 1998 (FSI, 1999). The plantations of this pine necessitated collection of seeds in large quantities. The time available for the harvesting of cones before seed fall is short and as a result, collection of sufficient quantity of seed is not always easy and the anxiety to collect large quantities of cones before seed dispersal sometimes results in the collection of immature cones producing very poor seed.

Good maturity indices, which includes physical as well as chemical characteristics of seeds/fruits are often the keys to successful seed collection. Physical indices of fruit or seed ripeness are the most commonly used indicators and amongst specific gravity, which is based on water loss during maturation, is a more objective index. As conifer cones ripen, the specific gravity of cones decreases due to loss of water and once the relationship between seed maturity and specific gravity of mature cones has been established, a container of a suitable liquid of known

specific gravity can be tried in the field for testing relative specific gravity of the cones. Specific gravity indices of maturity for cones have been established of a number of coniferous species (Anon., 1974; Singh, 1989, 1998).

Accordingly, the present study was undertaken to determine the seed maturity indices for *P. kesiya* for the collection of physiologically mature seed.

Material and Methods

The present study was undertaken in Riet Khawn forest near Shillong situated at 25° 34' N latitude and 1,350 m altitude in East Khasi Hills Forest Division of Meghalaya. Ten fully crowned trees were selected randomly and numbered serially in a plot of 100 m x 100 m in this forest. The cone collection was started from 1st December 2003 and continued upto 31st January 2004 on fortnightly basis. Ten cones were collected from each tree on each date and brought to the laboratory in sealed plastic bags for further analysis. The green cones were first weighed individually and volume was determined by water floatation method. The specific gravity (SG) of each cone was determined by dividing the green weight (gm) by its volume (cm³) following Oliver (1974). The mean specific gravity of cones of the species was determined for each collection date. Thereafter cones were opened manually and seeds were extracted for further tests. The germination and moisture content

determinations were carried out as per the standards of International Seed Testing Association (ISTA, 1993).

Results and Discussion

The results of the study in respect of specific gravity of cones, moisture content and germination percentage of seeds are presented in Table 1.

The specific gravity of cones collected at different dates varied from 0.80-1.24. The cones start opening as the specific gravity decreases below 0.91. The moisture content of Khasi pine seeds collected on different dates varied from 9.58 – 36.42 %. The germination percentage of seeds

increased with the decrease in specific gravity of the cones. Such relationship has also been reported by a number of workers in various coniferous species (Oliver, 1974; Singh, 1989, 1998). The cones of *Pinus kesiya* are found mature enough at the specific gravity of 0.91 and should be collected few days earlier before cones reach this stage, as seed ripening remains in progress in cone itself as reported in many other coniferous species (Singh *et al.*, 1996). Such early collections were also recommended by Rimbawanto *et al.* (1988) for cone collection in seed orchards of *Pinus radiata* in New Zealand. Various workers have reported the maturity indices of coniferous trees based on specific gravity of cones (Table 2).

Table 1

Specific gravity of cones, moisture content and germination percentage of seeds collected on different dates

Date of Collection	Specific gravity of cones	Moisture Content of Seeds (%)	Germination percentage
1st December 2003	1.24	36.42	12.20
15th December 2003	1.16	29.00	32.05
31st December 2003	1.02	18.50	36.50
15th January 2004	0.91	10.78	90.00
31st January 2004	0.80	9.58	90.00

Table 2

Cone specific gravity values that indicate seed maturity in some conifers.

Species	Specific Gravity	Reference
<i>Pinus roxburghii</i>	0.54 -0.83	Roy <i>et al.</i> , 2004
<i>P. elliotii</i>	0.95	Barnett, 1976
<i>P. palustris</i>	0.90	Barnett, 1976
<i>P. taeda</i>	0.90	Barnett, 1976
<i>P. strobus</i>	0.90	Bonner, 1976
<i>Abies pindrow</i>	0.97	Singh, 1998
<i>Picea smithiana</i>	0.96	Singh, 1989
<i>Pinus kesiya</i>	0.91	Present study

Variation in crop maturity often occurs among individual trees, and even on different sides of a single tree. The slight differences in aspect, elevation and other climatic conditions affect the time of maturity of the cones. It even varies from cone to cone of the same tree (Ching, 1960),

between trees of the same stand (Allen, 1958a), between stands in the same year (Fowells, 1949) and also from one year to the next (Allen, 1958b). In such circumstances, specific gravity of cones proves as a useful guide for seed collection.

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