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Timely seed collection - Collecting forest seed at the best time to achieve optimum quality

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Timely seed collection – Collecting forest seed at the best time to achieve optimum quality

Fruiting time

Almost all trees produce fruits at a distinct time of the year, which is much dependent on climate but does not necessarily occur at the same time. In Ethiopia most tree species have mature fruits in January – June depending on species; there are also species, that fruit at completely different time of the year, and some regions have different peak flowering. Within a species there may also be variation, e.g. in relation to the northern or southern part of the country, or from low to high altitude. Within a population flowering and subsequent fruiting may not start at the same time, - there may be early and late fruiting individuals. Fruit maturity also varies within the same individual. In some species, there are all stages from flowering to mature fruits at the same tree.

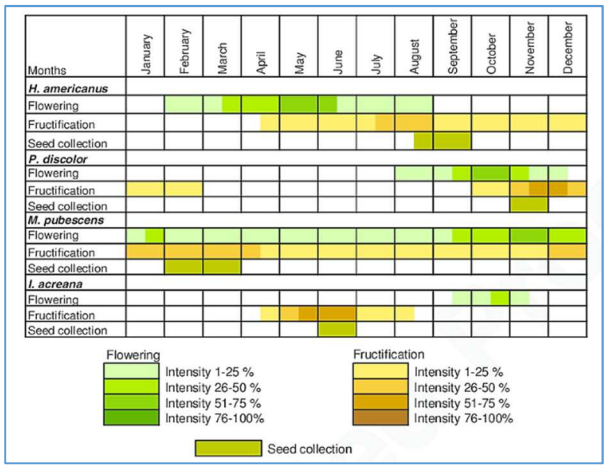

Figure 1. Example of a phenology recording system. For each species, three events are assessed on a monthly basis. Notice the large variation in seasonality; *M. pubescens* flower and fruit throughout the year

Development and maturation of fruits

Development from flower to fruits varies from few weeks in e.g. some legumes to more than a year in some conifers. In several large fruited species, the fruits take mature size and colour long time before they are mature and seeds are ready for dispersal. However, in most species it is possible to see when fruits are mature. That is when they are ready for dispersal. In most species, maturity of fruits is also maturity of seeds. Maturity of seeds is when they are able to germinate. For several species, germinability of seed is achieved before fruits are mature, and germinable seed can thus be obtained from fruits some times before they are shed.

Figure 2. Fruit and seed maturity is usually synchronized

Fruit maturity criteria

Fruits are the container of seeds, and fruits always show in some way, when they are ready to be dispersed. Dehiscent fruits open on the tree to release seed. Indehiscent fruits are dispersed before seed release, but the way they look, feel, smell, taste or break indicates, that they are ready to be dispersed, and this is the time most seeds are mature.

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Maturity indicator	Fruit type
Fruit stalk break	Most fruits, except some cones
Dehiscent sutures	Dehiscent fruits
Colourful	Fleshy fruits
Colour change from green to dull	Dry fruits
Softness	Fleshy fruits
Taste and smell	Fleshy fruits

Figure 3. Illustration of some common maturity criteria for fruits. The same criteria may apply where seeds are the dispersal unit, e.g. with aril or sarcotesta as the soft parts.

Testing seed maturity

Testing seed maturity requires extraction from some fruits. It is usually possible to see if seeds are mature if they are cut; - mature seeds should have a firm usually whitish embryo and / or endosperm, and the seed coat hard.

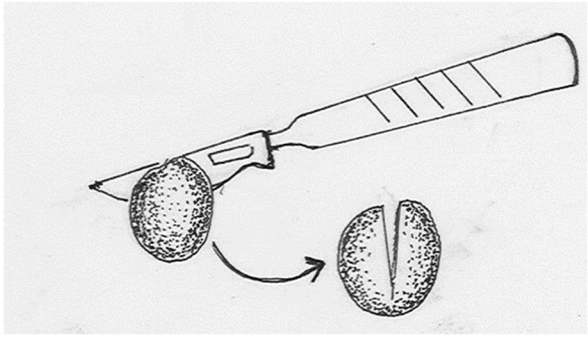

Figure 4. Cutting open fruits or seeds for inspection of the interior, e.g. embryo development or firmness and colour of the embryo / endosperm

Optimal time of fruiting

Optimal fruit collection is the peak of maturity, when many seeds are mature. That means that a lot of seed can be collected at the same time, and it thus time saving. It is also often the time when there are more and better seeds in the fruits, because peak fruiting was preceded by peak flowering, which probably gave the best pollination. And usually, the more fruits there are, the less is the proportion of insect attack. Opposite, early and late fruiting individuals often have poorer fruits with less seed, and especially late fruits often have insect attacks. Generally, seed will often deteriorate after they have achieved maturity.

Desiccation sensitive seeds can be a problem because seeds are mature very short time on the tree before they are dispersed of shed. There is thus very short time, that good seed can be collected.

Dispersal and predation

Seeds that are easily lost by dispersal must be collected as early as possible. Birds are fond of fleshy fruits, and fleshy attachments to seed like the aril of *Acacia saligna*.

Figure 5. Frugivorous birds may remove mature fruits when they are 'almost mature'. Sometimes seeds must be collected early to avoid loss to dispersal; such fruit can then be after-ripened under humid warm conditions for few days until they acquire full physiological maturity (germinability)

Summary, do's and don'ts:

Do's:

- Collect fruits during the peak fruiting season.
- Identify good maturity criteria for the species you collect.
- Collect seed as close to the time of natural dispersal as possible

Don'ts:

- Avoid collecting early or late fruits, and from early and late fruiting individuals.
- Don't wait for natural fruit fall; - seeds fallen under the mother trees may only be a fraction of all seeds produced

Selected readings

Schmidt, LH 2000. Guide to handling of tropical and subtropical tree seed. Danida
Forest Seed Centre, Denmark.

Otso Ovaskainen *et al.* Chronicles of nature calendar, a long-term and large-scale multitaxon database on phenology. https://www.nature.com/articles/s41597-020-0376-z.pdf

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Note: This Development Brief was written as an extension note for PATSPO project, Ethiopia