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Aframomum corrorima storage behavior status and its use as a plant in the community

Abstract

Storage behavior of *Aframomum corrorima* ginger family, Zingiberaceae(Braun) P.C.M. Jansen], seed Storage behavior study was conducted at Ethiopian Biodiversity Institute (EBI) based on the secondary data from the Gene bank. This study was started to conduct since March, 2017. The persistence of this study was to classify seed storage behavior. This economically important, endangered, and endemic (EEE) spice for the country was collected from 12different localities of, Keffasheka zone. Seeds were dried at room temperature, measured initial moisture content, 12.8% under 20°C, Seed were germinated by blotter method on filter paper, every 10 days taken germination data, final data was taken after 35 days. Grow very slowly, but all seeds germinate. To study them for long term conservation and sustainable utilization, all seeds kept under -10°C for 6months kept under -10°C, viability was 0%, means all seeds were not viable. According to the international seed storage behavior of (IBPGR 1991), seeds determined as recalcitrant seed behavior.

Keywords: *Aframomum corrorima,* recalcitrant, seed storage behavior

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Introduction

Korarima (Aframomumcorrorima) is a perennial and aromatic herb native and widely distributed in southwestern part of Ethiopia. It is known for its fine flavor as a spice in various Ethiopian traditional dishes. The moist montane forested land of the southwestern part of Ethiopia is dominated by forests that harbor genetic resources of vast social, economic and environmental importance. Every household has its own forest land with big trees used to hang traditional bee hives, to provide shade for different herb plants, like korarima and coffee, and to supply fruits, firewood and timber. This cultural practice helps the farmers to conserve the natural forest.[1] However, the forests are mostly fragmented mainly due to clear-cutting forests for expansion of agricultural fields which are currently being used for cereal production such as teff, maize, wheat, barley and perennial crops like *Ensetventricosum.* Expansion of settlements, both urban and rural, and cultivation are creating "Vegetation Islands".[2] Korarima is one of the species in which genetic erosion is a real threat since its natural habitat, the humid mountain forests of southwestern Ethiopia, is being decimated at an increasing rate.[1] To minimize the loss of korarima genetic resources, collecting germ plasms from different geographic locations and conserving them at in situ and ex situ conservation sites is the best strategy for conservation and sustainable utilization. Even though it is the best method this way of conservation is not reliable, if there is no back up in the gene bank, by ex-situ method of conservation. Ex-situ method of conservation such as *in vitro* & cryopreservation for long-term conservation & sustainable utilizations. If any natural disaster happens in its natural habitat the only possible way to continue sustainable growing and use will be, using in-vitro plant lets & cryo preserved embryo materials.

The use of korarima is only known from Ethiopia and Eritrea. The seeds (usually dried, sometimes fresh) are used to flavor all kinds of sauces, for which they are ground and usually mixed with other spices; occasionally they are also used to flavor[3] coffee, tea, bread and butter. In Ethiopia, the seeds are used medicinally as a tonic, carminative and purgative. The arilloid flesh around the seed is edible. Strings of fruits are sometimes used as an ornament, or as rosaries (by the Arabs), and in the past the fruits have been used as money in Ethiopia. It has economic impact for the local community in terms of income generating. Income generating on this special spice is very seasonal and for a very short time. The reason is that farmers cannot conserve the seeds for the next season; only, they leave the shrub after harvesting until the next production season in the forest. In these cases the plant can be grazed by forest animal, they can even be thrashed out by any natural disaster.

Korarima grows naturally at (1350–2000 m altitude in slightly shaded, more or less open sites in higher altitude rain forest. Annual rainfall varies from 1300 mm to more than 2000 mm; there is no distinct dry season but usually most rain falls in June–August (50–60%). The annual average temperature is about 20°C. In Ethiopia, korarima grows in almost the same habitats as wild coffee species (*Coffea*). This crop is categorized under the three EEE (Endangered, Endemic, Economically) important spices in the country. So this work covers a large amount of benefit for the local community at large for the institute to exchange genetic material without any disease or pathogen risk.

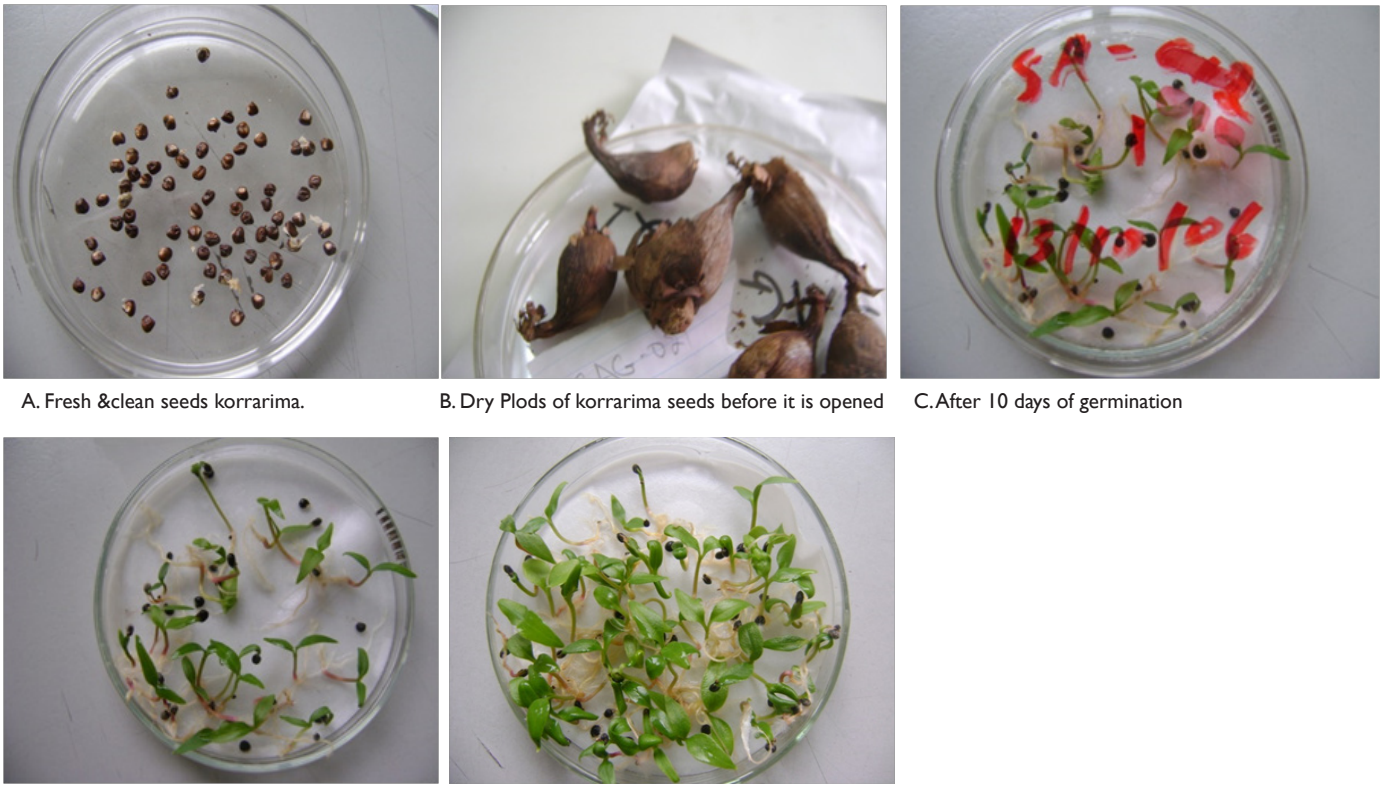
Materials & methods

Seeds were collected from Keffasheka zone different 10 house hold back yards. Mature seeds were collected as stated on the pictures (a&b). Fresh seeds were prepared manually, initial moisture content restrained 12.6% mm. At 20°C Mature red plods of korarima were collected manually. Kept all plods to be dried at room temperature. All seeds desiccated in the room moisture content were measured 19°C 7.9% mm. All seeds fumigated At EBI gene bank, pass all the process. Germination of seeds was done by blotter methods on filter papers at room temperature 25°C. Data was recorded every 10 days. Only 3-5 seeds show small response on each plate, again after 25 days 35% of seeds show growth, only after 45 days show growth performance in all plates.

Methodology

Collected plods were opened and make ready for drying at room temperature, 25°C, all seeds were dried, and initial moisture content measured 12.7% at 20°C. Fumigated, well trashed and mechanically cleaned. Seeds labeled accordingly, separately surface sterilized in 7% ethanol for10 minutes, washed three times in distilled water. All seeds disseminate for germination test by blotter method on sterilized filter paper and used distilled water. This will help to determine storage behavior and categorize seed conservation for long- term conservation & sustainable utilization. Determination to avoid seed contamination from any pathogen. Maybe using distilled water can slow germination process, but seed contamination was eliminated. On which on average 3-5 seeds per plate show growth performance, First data was measured after 10 days, then after 25 days, more than 35% of all plate show growth, finally after 45 days all seeds grow well.[4,5]

Korrarima(*affframomum korrarima*) germination report (Figures 1&2)



A. Fresh &clean seeds korrarima. B. Dry Plods of korrarima seeds before it is opened C. After 10 days of germination

D. After 25 days some of the seeds left. E. 45 days, all seeds grow showing good performance.

Figure 1 Korrarima(*affframomumkorrarima*) germination report.

Result and discussion

Labeled seeds, fumigated and left from germination test were kept under -10°C for six months, under hemetric conditions. After this viability of seeds was checked viability 0%. In all plates, this shows that seeds can be determined as intermediates or recalcitrant type of seeds. The storage medium is therefore very important for recalcitrant seeds. In this case since the initial moisture content was 7.2 %, under 20°C and above. This seeds if we dissect more all seeds die. Growth values; second, allow diffusion of sufficient oxygen to the moist seeds. The storage of moist recalcitrant seeds in damp charcoal, sawdust, or moist sand is generally reported to be more efficient than storage in polyethylene bags, which is usual method of seed conservation in the gene bank. This method is useful and applicable only for orthodox seeds.

Conclusion & recommendation

The team decided that, *Aframomum corrorima* storage behavior status currently, recognized as recalcitrant seed storage behavior, but as far as this spice is very important for the community and at large for the country, its further long-term conservation technique has to be recognized by any of bio-technological tools such as *in-vitro* or *cryo preservation* approaches for a better presentation with the standard genetic material exchange system.

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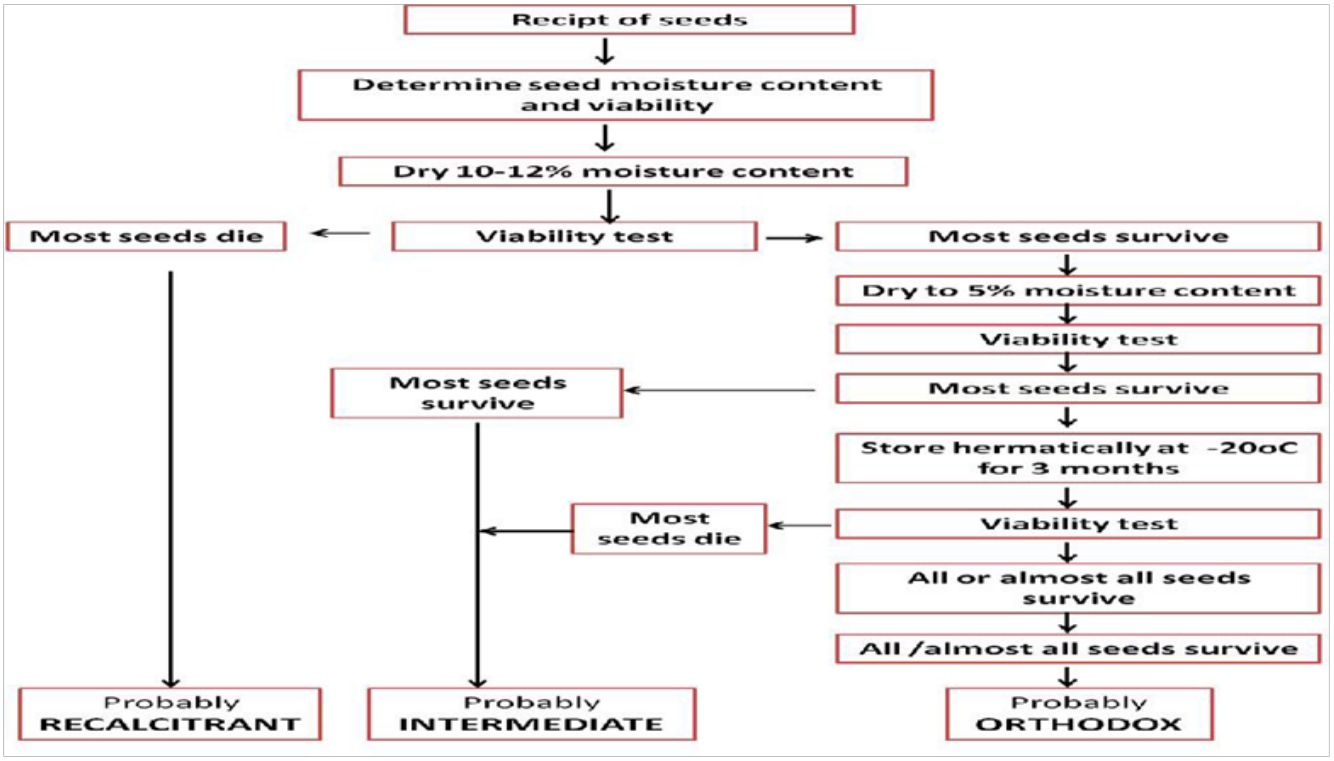

Figure 2 Standard protocol for seed storage behavior determination. (IPBGR).

Conflicts of interest

The author declares there are no conflicts of interest.

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