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## Introducing a New Crop: Reasons Why Seeds Fail

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Many of you have graciously taken the time to fill out the seed harvest report form that accompanies each mailing of seeds from our seed bank. In reading reports from people in our network, we want to learn whether the seeds we are sending out have improved the lives of poor small-holder farmers. Looking at seed harvest reports dating back to 2000, I found that there seemed to be more reports of failure than success. Why would that be the case? Part of the answer is inherent in experimentation. One must be prepared to evaluate many crops/varieties before identifying a few winners. You may have heard it said that there is no such thing as a “failed” experiment, as knowledge is gained and lessons are learned whatever the results.

In many cases, however, failures occur that could have been successes. Reasons cited for various failures contain some common themes. This article, based entirely on reports from our ECHO network, is meant to help you improve the success of crop trials and introductions by pointing out common pitfalls and key factors for success.

One of the most common reasons for seeds failing is that the crop is not suited to the prevailing climate and growing conditions. Seeds in ECHO’s seed bank are selected for their ability to grow and thrive under difficult growing conditions. Few if any crops, however, tolerate every extreme condition one might encounter. For instance, established moringa (*Moringa* sp.) trees are quite drought tolerant and grow well in a wide range of soils. Moringa is not tolerant, though, of flooded, poorly drained soil. Nor, as confirmed by a report from South Africa, is moringa well suited to areas that experience cold weather.

A related cause for setbacks is that growing conditions, even in the same area, can vary greatly throughout the year. A failed tomato crop in Sierra Leone was attributed to high rainfall, as humidity and the splashing action of rain drops spread plant diseases. If irrigation is possible, the dry season is often the best time to grow vegetables. Network members have also reported mold on grain heads of amaranth and sorghum maturing during the rains. Sometimes it works best to plant part-way through the rainy season so that the crop becomes established during the rains but the edible portion matures during the drier months.

As another example of varying seasonal conditions, maize in Haiti and Nigeria was reported to have performed poorly when planted late in the year. Maize grows best with lots of sunlight, requiring long days. If in doubt as to the best planting time for your area, try keeping some of the seed back for an alternate planting date.

Even with crops that are carefully selected to match growing conditions, problems can occur, starting as early in the crop cycle as germination. ECHO's seeds are tested annually for germination, but the germination percentage is based on a sample and cannot be guaranteed. Hard-coated seeds such as winged bean (*Psophocarpus tetragonolobus*) will germinate better if nicked or soaked in hot water before planting. Some seeds, like neem (*Azadirachta indica*) and jackfruit (*Artocarpus heterophyllus*), do not remain viable for long periods of time. These crops are harvested and mailed fresh, but should be planted very soon after they are received. Many network members have reported low germination of strawberry tree (*Muntingia calabura*) and katuk (*Sauropus androgynus*). Strawberry tree seed germinates well with seeds squeezed from a ripe fruit directly onto the soil; however, we must dry the seed to be able to store and mail it. Katuk is better propagated by cuttings than seeds, but seeds are easier to mail. These crops that do not germinate well from dry seed are best suited for the development practitioner who can accept very low seed germination in hopes of obtaining a few plants that can then be multiplied by other means.

Often, the problem is due to other factors besides the seed itself. Strive to plant soon after opening a seed packet. Once the packet is opened, humidity can adversely affect seed viability. Another important cause for failure includes planting seeds too deeply; tiny seeds need little or no soil covering but are extremely vulnerable to drying out. After planting, allowing the soil to dry out can kill emerging seedlings. Consistent watering with adequate drainage is essential. Soil borne fungal diseases can damage the stems of tender seedlings, causing them to wilt and die.

Insect pests account for a number of failures. We learned of at least two instances, one in Haiti and another in Belize, in which planted seeds were carried off by ants. Moringa plants in Sierra Leone were said to be eaten by termites. Collards were consumed by leaf-cutter ants in Belize. A locust invasion was reported to have wiped out a planting in Mauritania. One network member reported aphids as a problem on yard long beans (*Vigna unguiculata ssp. sesquipedalis*) and then went on to mention that Cornell spray [5 Tbsp (tablespoons) vegetable oil; 1 Tbsp baking soda; 2 Tbsp dish soap] was effective.

Other pests include a host of animal life. Iguanas were a problem on Ethiopian Kale (*Brassica carinata*) in Costa Rica. Foraging chickens and grazing livestock cause numerous failures. It is often necessary to build sturdy fences to protect plantings and then monitor and repair them as needed over time. In areas where chickens cannot be excluded, consider transplanting large plants (e.g. at ECHO we root sugar cane cuttings in pots before transplanting out where chickens are present), or placing obstacles such as palm branches on garden beds or around the base of plantings.

In protecting plants from pests, the level of intervention depends on the crop and what local farmers are doing with similar crops. One could simply ignore the pests and hope for the rare plant that is especially tolerant. If low-cost and farmer-accepted methods of insect control exist, however, it could be advantageous to monitor insect activity and intervene as needed to keep infestations to a manageable level. It is wise to decide ahead of time the level of inputs and intervention you will devote to a particular crop. Fruit trees, for example, would merit much more care than a forage crop.

A final category of reasons for failure go beyond growing the crop. Sometimes a combination of cultural and economic issues comes into play. Lettuce was reported to be an attractive crop to Cambodian farmers selling to restaurants, but farmers in Cameroon rejected lettuce in favor of starchy crops that fill the stomach faster. African okra (*Abelmoschus esculentus*) pods, because of their large size, are often assumed to be too tough/woody to eat. Simply growing the crop is not enough. It is important to let farmers taste it, to evaluate it for ease of cooking, and to consider the economics of growing the crop. An onion variety that grew successfully in Belize produced well but turned out to spoil in storage too quickly to be used commercially.

Factors contributing to success, then, are: 1) careful selection of plants considering local climate/growing conditions; 2) proper planting time, taking into account seasonal changes in weather patterns; 3) care and protection of seeds and seedlings, at least until plants are well established; and 4) attention to cultural and economic issues or constraints that affect farmer acceptance of a new crop.