PALM SEED GERMINATION
University of Florida
IFAS Cooperative Extension Service

Summary:

Pindo Palms require a time of dry dormancy before planting – these seeds have been in dry storage since late July, 2005; further dry storage may be beneficial.

Soaking of seeds in water for 1-7 days immediately before planting will increase germination rates. Change water at least daily.

Using deeper containers rather than flats is recommended

Using 1:1 peat moss and perlite mixture is recommended. Soil should retain even moisture but not become soggy

Cover the seed to the level equal to the diameter of the seed. If germinating in Full Sun, covering deeper may be required; in shade more shallow planting is acceptable, even to the point of planting the top of the seed level with the top of the soil.

Germinating in the shade will allow the soil to remain consistently moist without constant irrigation.

Best germinated with 2-3 weeks at 102 degrees F, followed by 86 degrees for the duration of the germination period

Pindo palms can take 6 months to over a year to germinate.

When transplanting the seedlings note that palms are very intolerant of being planted too deep, regardless of age or size. For palm seedlings, planting as little as 1/2" too deep can result in severe production setbacks and ultimately death of the seedlings

Pretreatment Before Planting

Due to the often slow and uneven germination of palm seeds, there has been a great deal of interest in any preplant treatments that might speed germination or result in more even rates of germination. For the commercial palm grower, the value of seed pretreatments must be weighed against the additional labor costs involved.

Water soak. A fairly universal recommendation has been to soak palm seed in water for 1 to 7 days. It is advisable to change the water daily. Such a pretreatment is useful only after dormancy requirements (if any) have been met, though few palm species have been tested for indications of seed dormancy. The seed must be planted immediately after the treatment, as storage following water imbibation may induce a secondary dormancy.

Sowing Palm Seed

Containers. A variety of germination containers can be used for palms seeds, including pots and flats. Pots are better than flats due to the deeper soil column and better drainage. Some growers prefer to sow seed in large raised beds constructed from wood or cinder blocks. The most important consideration for any germination container is that it allows adequate drainage of excess water from the medium.

Medium. Palm seed germination media must be well-drained, yet have some moisture holding capacity. A pattern of alternate extremes of dryness and wetness is detrimental to palm seeds during germination. Particle size in the medium should not be excessively large nor prone to separation with repeated irrigation. A 1:1 by volume mixture of peat moss and perlite has been successfully used under a wide range of nursery conditions. The mix in a germination medium should be adjusted depending on the conditions to which the seed will be exposed. For example, seed germinated in full sun will require a medium with higher water holding capacity than seed germinated under shade, all other conditions being equal.

Planting depth and spacing. **A rule of thumb to follow is to cover the seed to a level equal to the diameter of the seed.** For example, seed 1/4" in diameter would be planted at a depth of 1/4" below the surface. The conditions under which seed will be germinated dictates depth of planting. If seed will be germinated in full sun, it is usually necessary to cover the seed with medium so that it will not dry out. However, if the seed is to be germinated under shade, it is usually better to sow it shallowly. In the case of larger seeds, this means merely pressing them into the soil so that the top of the seed is exposed. Frequency of irrigation will also influence the planting depth. Seed germinated in full sun can be planted more shallowly if irrigation will be frequent enough so that the medium does not dry out.

The initial planting density depends on the ultimate use of the germinated seedlings as well as how quickly the nursery operator anticipates transplanting the seedlings. Many growers broadcast small (1/4" diameter or less) and medium-sized (1/2 to 1" diameter) palm seed very thickly in the germinating container, in some cases completely covering the surface of the medium with seed. This works fine (and saves space and labor) if the transplanted liner will consist of all or a number of the seedlings potted together or if the seedlings will be separated and transplanted before a great deal of root development has taken place. **Otherwise, it is best to sow the seed with some space between adjacent seeds.**

Germination Conditions

Temperature. Virtually all palms require high temperatures for the most rapid and uniform germination of their seed. Seventy to 100^{o} F is the accepted range, and 85-95^{o} probably yields the best results. **Seed of Pindo palm (*Butia capitata*) germinated best with 2-3 weeks at 102^{o} F, followed by 86^{o} for the duration of the germination period.**

Since palm seeds require high germination temperatures, it is best to sow seed during the warmer months of the year. If availability of fresh seed makes this difficult, soil temperatures can be increased by using bottom heat below the germination containers or covering the containers with clear plastic. Placing the containers on a heat retaining surface can also increase temperatures by several degrees.

Light.. Seedlings can be germinated in full sun but their leaves may bleach to some extent under those conditions. Many growers feel that, despite the bleaching, root growth and overall seedling development are enhanced in full sun. Under shade, seedlings will generally have a deeper green color. Species native to open habitats show no ill effects when germinated in full sun. It is generally necessary to adjust seed planting depth according to the light levels to which the seed will be exposed (see previous section).

Irrigation. Palm seeds require **uniform moisture** during the first critical stages of germination when the palm first emerges from the seed. Alternating periods of extreme wet and dry during this time period will usually have deleterious effects on total germination percentages. If the germination medium does not receive some type of automatic irrigation, it may be necessary to cover the containers with clear plastic to retain adequate soil moisture. Overwatering can be equally deleterious. At no time should standing water be visible on the surface of the germinating medium.

Fertilization. Palm seedlings do not require supplementary fertilization for the first two months after germination. The endosperm within the seed provides all the nutrition that the seedling needs during this period. Supplemental fertilization during the first two months is not only wasteful, but can injure the young seedling.

Germination time. The rate at which palm seed germinates, the uniformity of germination, and the percentage of total germination can vary tremendously from species to species, from seed lots collected from different plants of the same species, and even from seed lots collected in different years from the same plant. Pindo palms can take 6 months to over a year to germinate. Dry storage seems to speed up the germination. **(These seeds have been in dry storage since late July, 2005)** Remain patient as long as the seed appears in good condition.

Transplanting the Seedlings

Palm seedlings may be transplanted either immediately after germination or after 1-4 leaves have formed. The objective is to lessen the degree of root disturbance to the seedlings; thus it is best to transplant before roots begin to circle the container or roots of adjacent seedlings become entangled. Transplant in the warmer months of the year, when root growth will be rapid. Delay transplanting until at least one leaf has appeared. Seedlings will usually have one long root at the time of first transplanting. Seedlings should be first transferred from the germination container to a small liner pot that just accommodates the root system and allows some subsequent root growth. Deep liner pots with essentially open bottoms are being used by a increasing number of growers. Palm seedlings benefit from the deeper root run, and long roots emerging through the bottom opening are "air pruned" and cease growth, thus significantly eliminating the circling of roots around the inside walls of the pot. Two strategies are then possible for subsequent transplanting of the seedlings. They can be shifted successively to slightly larger containers as they grow (frequent small shifts), or they can be transplanted to larger containers than their size might seem to warrant (fewer and larger shifts). Frequent small shifts lessen the chance of loss due to over-watering, but increase labor costs. Transplanting into large containers lowers labor costs and provides for more unrestricted root growth, but may promote increased loss due to root rots when the seedlings are small. Thus, larger, less frequent shifts will require careful irrigation monitoring while the transplants establish in the new containers.

Palms are very intolerant of being planted too deep, regardless of age or size. For palm seedlings, planting as little as 1/2" too deep can result in severe production setbacks and ultimately death of the seedlings. Palm seedlings should be transplanted so that the point on the seedling stem just above where the root system appears to begin lies at the soil surface. This point is sometimes marked by a noticeable swelling, particularly on older seedlings. On palms with adjacent germination, it is the point at the base of the button. Do not sever the connection of the seed to the seedling palm. If the seed is still attached to the plant by the cotyledonary petiole (remote germination), drape the seed over the edge of the pot or allow it to sit on the soil surface.

Some growers prune palm seedling roots when transplanting. This is not recommended, and usually results in growth setbacks or even death of some of the seedlings. If the seedling root is longer than the transplant container, it can be allowed to slightly curve upward or around the inside perimeter of the container. A better solution is use pots large enough to accommodate the full length of the root.

Ideally, newly transplanted seedlings should be placed under light shade (30-50%) for several weeks, or until new growth is apparent. If this is not possible, irrigation frequency must be carefully monitored so that the transplants are not water-stressed during establishment.