

# LEUCAENA

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## ECHO TECHNICAL NOTE

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*Leucaena leucocephala* ("koa haole" -Hawaii; ipil ipil - Phillipines) is a fast-growing, leguminous tree that can be used for reforestation, for firewood, and as a forage crop that can equal alfalfa in nutritional value. There are three basic types of leucaena trees: Hawaiian, Salvador, and Peru. There are also crosses between these. You need to choose the type that best fills your needs. The Hawaiian type is short and bushy. Because its yield of wood and foliage is low compared to the other two types, this would probably be a poor choice. The Salvador type (Hawaiian giant) is tall and tree-like. The trees can grow 60 ft. in height in five years. The best varieties of this type are K8 (Mexico), K28, K67 and K72. K67 is the best variety for projects that need to produce large quantities of seed. The Peru type is tall with extensive branching. The trees are good for forage. Good varieties are K6 and K62. An excellent forage-type leucaena is the Cunningham (K500) which was developed in Australia. It is a cross between the Salvador and Peru types.

## CULTURAL REQUIREMENTS

### SEED AND SEED PREPARATION

Leucaena trees will fully repay your efforts to obtain uniform germination and good establishment. Like other trees, leucaena establishes slowly and a little tender, loving care is advisable.

Leucaena does not establish well in acid soils, preferring a pH similar to maize of 5.5 or above. Phosphorus addition is suggested in P-depleted soils. Other elements that may be limiting to establishment include calcium, sulfur, zinc, boron and molybdenum. Seed pelleting with lime and P, or their addition at time of transplanting would be valuable in many tropical soils.

Seeds should be well dried, insect-free, fungus-free, and weed-free. "Giant" varieties have about 8000 seeds per pound (or 20,900 per kg) and common varieties about 12,000/pound. Seeds are often treated with the mild insecticide, Sevin.

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Seeds do not germinate unless they are scarified (literally meaning "scratched") by scratching or cracking the tough, water-impervious seed coat. Of the following three ways, the first is worth the time:

- Scratch or nick each seed with a triangular file, small scissors or knife. Works 100%.
- Acid etch; Concentrated sulfuric acid is poured over seeds for 15 minutes, then washed exhaustively.
- Hot water treatment: Vigorously boiling water is poured over seeds, about one gallon per pound of seeds, stirred gently and poured off in 3-5 minutes. Works about 70%. Alternatively, 80 degrees C. for 3 minutes.

Leucaena is a legume, and bacterial inoculation is necessary for good nodulation and growth. Many tropical soils contain appropriate bacteria, but preliminary tests are advised. ECHO is unable to keep inoculant on hand. Many countries manufacture inoculants for a number of crops. You may wish to contact your local agricultural extension agency or national department of agriculture to see if the inoculant you are looking for needs to be imported. If it does, Agroforester Tropical Seeds sells the appropriate Rhizobium strain: P.O. Box 428, Holualoa, HI 96725, phone 808/324-4427, FAX 808/324-4129, e-mail: agroforester@igc.org. (As of August 1998 their smallest packet was \$6.00 plus shipping.)

### PLANTING

Transplanting is preferred, but leucaena seeds can be drilled for direct planting on large acreages. Establishment is slow, with about 6 weeks in a small seedling stage (9 to 30 cm). Then growth is more rapid, reaching 2 m in about 8 more weeks. Weeds are the major problem.

We recommend about 2,500 to 10,000 trees per hectare for wood, or 75,000 to 100,000 trees per hectare for forage management. Seeds can be drilled with a grain drill or dropped through a hand-jabber. Good land preparation and weed control are extremely important. Lasso (alachlor), Dacthal and Tok (nitrofen) are good pre-emergence herbicides for direct seeding. Water should be made available during germination and early growth.

Excellent seedlings are obtained from extruded plastic tubes that are long (20 cm), narrow (3 cm diameter) and tapered at base (to 1 cm). Leucaena roots are deep and little-branched; plastic cups or used tin cans make poor containers. Seeds can be planted directly in the containers or soaked for two days to identify the viable seeds (those that enlarge about double in size). A mixture of peat and soil is suggested and a cracked rock layer on top will minimize fungus. Nodulation can generally be assured if soil is taken from leucaena-growing areas. Fungi causing damping off are not serious on leucaena, but use of a fungicide in the first few weeks of growth may be advisable. Seedlings can be transplanted, but it is not recommended, since seedlings grown in deep beds root very rapidly and are damaged greatly on transplanting.

### OTHER

Until 1982 leucaena was considered to be practically pest free aside from seed weevils which can attack the maturing seeds. In late 1982 the leucaena psyllid (*Heteropsylla cubana*) or "jumping plant lice" emerged as a major pest in some parts of the world. In Central America where the giant leucaena is native, natural insect predation seems to keep it under control. However, when the pest was spread to places such as the Philippines, damage was often severe. In addition to chemical controls, work on resistant strains and biological controls is ongoing. For many projects where leucaena has been the sole species used this has been a costly reminder of the importance of using a variety of species and cultivars in projects.

Leucaena varieties are generally highly self-fertilizing. Select outstanding, uniform trees, roguing out the plants that are off-type, dwarfed, shrubby or producing seeds too prematurely or frequently. Harvest and dry the seeds, label carefully as to variety and source, and store as noted above. Keep seeds dry and they will last for years, and probably longer if refrigerated. Store in a tightly closed plastic bag or bottle.

## SOURCES OF SEED

Upon Dr. Brewbaker's recommendation, ECHO has always distributed more than one variety of leucaena. Being a long-lived, self-pollinated, pure-line tree, folks should avoid planting only one variety over large areas (see pests above). **ECHO** distributes small packets of each for experimental purposes:

- K156 and K784 – good for hedgerows, intercropping, alley cropping; K784 is psyllid resistant
- Peruvian K6 – tall with extensive branching; good forage
- KX2 – psyllid resistant; high production of leaf material
- K4 and K743 (hybrid) – low in mimosine, which is toxic to animals in large quantities
- K636 – psyllid resistant
- Cunningham K500 – excellent forage
- K28 and K57 – tall, tree like

Other sources around the world would include the following (varieties and inoculant supplied as noted):

### AFRICA

ETHIOPIA. Forestry Research Center, P.O. Box 30708, Addis Ababa, Ethiopia.

KENYA. Kenya Forestry Seed Centre, P.O. Box 20412, Nairobi, Kenya.

MALAWI. Forestry Research Institute of Malawi, P.O. Box 270, Zomba, Malawi.

MOZAMBIQUE. Centro de Experimentacao Florestal, Marracuene, Mozambique. antonia@ribeiro.uem.mz

TANZANIA. Tanzania Forestry Research Institute, P.O. Box 95, Lushoto, Tanzania.

ZIMBABWE. Forestry Commission, Forest Research Centre, Tree Seed Centre, P.O. Box HG, 595, Highlands, Harare, Zimbabwe. frchigh@harare.iafrica.com

### AMERICAS

COSTA RICA. CATIE, Catie 7170, P.O. Box 137, Turrialba, Costa Rica. wvasques@catie.ac.cr

HONDURAS. Forest Tree Seed Bank, Apdo. Postal No. 2, Siguatepeque, Honduras.

NICARAGUA. Centro de Mejoramiento Genetico de Semillas Forestales, Aptdo 630, Leon, Nicaragua.

U. S. A. Agroforester Tropical Seeds, P.O. Box 428, Holualoa, HI 96725, USA. agroforester@igc.org

### ASIA

MYANMAR. Forest Research Institute, Yezin, Pyinmana Township, Myanmar.

PAKISTAN. Pakistan Forest Institute, PO Forest Institute, Preshawar, Pakistan.

PHILIPPINES. Department of Forestry, Visayas State College of Agriculture, 6521 Baybay, Leyte, Philippines.

SINGAPORE. Inland & Foreign Trading Co., Block 79A, Indus Road #04-418, Singapore 169589, Singapore. iftco@pacific.net.sg

THAILAND. ASEAN Forest Tree Seed Centre, Muak Lek, Saraburi, 18180, Thailand. aftsc@cgnet.com

### AUSTRALIA

M.L. Farrar Pty. Limited, P.O. Box 1046, Bomaderry, N.S.W. 2541, Australia.

Australian Tropical Forages Genetic Resource Centre, CSIRO Tropical Agriculture, 306 Carmody Rd, St. Lucia, 4067, Australia. bryan.hacker@tag.csiro.au

### EUROPE

DENMARK. DANIDA Forest Seed Centre, Krogerupvej 21, DK-3050 Humlebaek, Denmark.

dfscdk@post4.tele.dk

UNITED KINGDOM. The Henry Doubleday Research Association, Ryton on Dunsmore, Coventry CV8 3LG, U.K. eroycrof@hdra.demon.co.uk

For additional information, write:

- James L. Brewbaker, Dept. Hort., College of Tropical Agric., Univ. of Hawaii, 3190 Maile Way, Honolulu, HI 96822, USA. (Varieties, species, fuelwood production).
- Ray Jones, Davies Lab., CSIRO, Townsville, Queensland 4810, Australia. (Forage production, nutrition).
- Ta Wei Huy, Taiwan Forest Research Institute, Botanic Garden, 37 Nan-Hai Road, Taipei, Taiwan, R.O.C. (Silviculture, pulpwood).
- ICRAF (International Centre for Research in Agroforestry), P.O. Box 30677, Nairobi, KENYA (Information).
- Trees for the Future, 11306 Estona Drive, P.O. Box 1786, Silver Spring, MD 20915-1786 (Information).