

New Developments in the Giant Reed (*Arundo donax*) and Bamboo Two Highly Productive Biomass Crops for Food, Fuel and Fiber

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New Developments in Bamboo and *Arundo donax*

Current research and experience with bamboo and other biomass plants at West Wind Technology (WWT) now makes available plantlets, nursery consultation and plantation management. In this hemisphere bamboo and *Arundo donax* were not widely considered as a viable non-wood species for industrial uses because of enormous establishment cost. For the first time, this major barrier to industrial use of bamboo and *Arundo donax* has now been overcome by using never before available propagation methods. Bamboo and *Arundo donax* biomass feedstock can now be available by the time the processing facility construction is completed (in 2-4 years).

Bamboo and *Arundo donax* have the following industrial uses:

- 1) Bamboo Shoots for food.
- 2) Bamboo and *Arundo donax* Biomass for pulp, ethanol, and electrical energy.
- 3) Bamboo and *Arundo donax* Fiber for composites, panels, flooring, beams, crossties, rebar.

Bamboo and *Arundo donax* have the following characteristics:

- 1) High biomass production.
- 2) Harvest annually or biannually.
- 3) Replanting every 25 – 120+ years.
- 4) Mechanical planting and harvest available.
- 5) Long, thin, high quality fiber for non-woven textiles, composites, pulp and almost all grades of paper.

Industrial technologies being investigated may make possible efficient ethanol production from bamboo and *Arundo donax* up to 160 gallons of ethanol from one dry ton of bamboo. Technology from new pulping systems allows environmentally friendly pulp production from small pulp mills (30 to 500 tons per day) at competitive prices. New developments in composites allow bamboo to be made into many exciting products, even some without glue. Non Woven Textiles from bamboo and *Arundo donax* are being developed.

Today, markets and special arrangements with financial services allow industrial biomass projects to be developed in most any country with appropriate plantation sites (3,000+ hectares). Our newest projects are being developed in Mexico, Haiti, Honduras, and Vietnam.

Giant Reed Grass or *Arundo donax* and Bamboos have long been recognized as important non-wood industrial biomass-producing plants that can be grown on a wide variety of soil types and in a wide range of climatic conditions. The commercial availability of these non-wood fiber resources, now available because of these developments by WWT, will have a tremendous impact on the wood fiber situation worldwide. The major factor that has limited Giant Reed Grass and Bamboo utilization has been the cost of planting and availability of planting material when attempting to establish large plantations. Before these developments, plants for plantation establishment were usually dug and moved by intensive manual labor. This also required a large stock of wild planting material to be available near the desired plantation site and also locally available labor at low rates. Very few plantations were ever established due to these restrictions, even though the commercial potential of these plants was well known since the early 1900's.

This development solves the major problems restricting the use of these plants as a large-scale feedstock for the industrial production of paper pulp, fuel, food, fiber, building materials, etc.

Since Giant Reed Grass and Bamboo rarely produce viable seed, propagules must be produced by vegetative means, using very costly labor-intensive methods, such as, digging the rhizomes, transporting them to the site, keeping them wet for the whole period and finally replanting at the new site. Smaller plant parts may be placed in a plant bed system and multiplied at a slow rate, dug, and then transported to the site to be transplanted. This new system, combining tissue culture and non-sterile multiplication is a means of producing massive numbers of high quality transplants, which is very different from the conventional plant bed multiplication systems. In this new method the tissue culture plants are grown in trays filled with soil-less potting mixtures which are moved “conveyor belt style” from start to finish. Nursery staff only touch the plantlets twice, once to place the plants into the tray and once to drop the plants into the mechanical transplanter.

For the first time, our combined systems allow economical development of large sustainable plantations, with very high carbon sequestration capability, of the most productive biomass plants ever reported in scientific literature.

In most cases, this invention allows a plantation to be established and ready for harvest in less than three years. No longer does the location of the natural stands of raw material have to determine the site for an industrial facility, indeed, a plantation can be developed at the same time an industrial processing facility is being constructed. This system allows for manual or mechanical planting of the most productive biomass crops, which can be used for energy, paper pulp, food, phytoremediation, carbon sequestration, composites and building material.

West Wind Technology can find the sites and partners to establish a custom biomass plantations and/or an industry to locate at the plantation site, as well as, a market for the products. Biomass fiber currently is available from WWT's established stands for immediate industrial use.

References

[1] Perdue, R. E., Jr., *Arundo donax*: Source of Musical Reeds and Industrial Cellulose, Agricultural Research Service U. S Dept. of Agriculture, Beltsville, MD, 1958 pages 17-30