

# Short-rotation intensively cultured woody biomass plantations

Woody biomass plots at Sierra Foothill Range Field Station.

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**B**eginning in the early 1970s with the Arab oil embargo and rapidly increasing energy costs, wood came to be viewed as a potential alternative source of renewable energy. Firewood and cogeneration technology, two already-developed uses of wood for energy, received new emphasis. With these new energy-oriented markets for wood, ranchers, forest owners, farmers, and owners of small rural properties began to come to the University of California's Cooperative Extension with questions about planting trees to produce wood energy crops, predominantly firewood. Interest in tree planting escalated when growers heard claims, often unsubstantiated, of extremely high growth rates, especially in eucalyptus.

Attention focused on using exotic hardwood trees such as hybrid poplars and eucalyptus in short-rotation, intensively cultured (SRIC) plantations. The wood products industry, interested in increasing fiber for paper manufacturing, reported 3- to 10-fold yield increases over conventionally managed forests in different places in the world. Improved seed and clonal out-planting stock of exotic hardwood species were available for testing in California. In addition, turn-of-the-century, privately owned eucalyptus plantations in California, and some U.S. Department of Agriculture and industry-sponsored programs in the state using eucalyptus and other hardwood trees established in the 1960s, made it abundantly clear that wood fiber production for energy production could be increased dramatically by intensive culture.

University of California scientists established research plots in several counties and at UC agricultural field stations to learn what species could be grown on different sites, what management practices were necessary, and what range of growth rates could be expected.

## Coordinated approach

As grower interest in planting biomass species increased and research gaps became more obvious, Cooperative Extension and Agricultural Experiment Station researchers organized the Biomass Workgroup in 1982 to address problems in the growth, management, harvest, and marketing of tree species for biomass. Initial priorities for the workgroup were to identify current data on biomass production applicable to California growers, identify information gaps, form standardized procedures for developing

new research-based information, and address claims of super growth.

Work on these initial goals was coordinated with the efforts of several state and federal agencies, and a cooperative group of interested private and public parties known as the Eucalyptus Improvement Association. The workgroup currently consists of 27 individuals with backgrounds in forestry and wood products, horticulture, engineering, agricultural economics, agronomy, weed science, and range management. Among the workgroup's highest priorities are to: (1) determine per acre growth rates of various species at different levels of management input in different California regions and climatic areas; (2) evaluate the economics of production to assess the management potential in different parts of the state; and (3) develop genetically improved sources of the most promising species.

## The outlook

As a result of the team approach, considerable headway has been made in addressing the priorities. The series of papers in this issue highlights some of these accomplishments.

Even though these studies have shown that the potential yields from California short-rotation intensive culture are among the best reported anywhere in the world, various factors limit the extent to which plantations can be established at present. Scattered markets for higher value products such as paper pulp and low prices for biomass products may limit planting programs for the time being. Cold temperatures and droughty sites are two important factors that have caused SRIC plantations to fail in some parts of the state. Research on the selection of clones and seed sources of tree species to improve survival in marginal sites is under way. Some plantations have also failed as a result of poor silvicultural practices, such as planting methods and weed control, pointing to the need for education on management techniques.

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