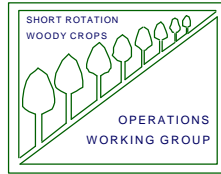


Short-Rotation Woody Crops Operations Working Group NEWSLETTER

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Number five

July 1999

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MEETING OF THE SRWC-OWG STEERING COMMITTEE

The SRWC-OWG Steering Committee plans to meet this year in Alexandria, Minnesota on August 18th. The location and date will allow for attendance at the annual Poplar Council meeting. The time will be from 7:00 - 10:00 (tables will be set aside at the Poplar Council dinner). Unfinished business will be concluded during the field trip on the 19th. Topics for the Steering Committee include: preliminary planning for the conference in 2000, administrative sponsor activities, budget issues, new activities for the Working Group, and any other topics suggested by the membership.

Biennial Meeting of the Poplar Council of the United States

August 18 - 19, 1999

Hosted by

WesMin RC&D and Champion International
Holiday Inn - Alexandria, MN

August 18 Wednesday

1:00 - 4:30 – Contributed Paper Session and Program Reports including: International Poplar Commission, Canadian Poplar Council, WestVaco, MN Cooperative and DOE Biomass Breeding Programs.
4:30 - 5:00 – PM Business Meeting
6:30 – Poplar Council Dinner Buffet

August 19 Thursday

8:00 – Bus travel to Herman Rosholt Research Farm
9:00 - 12:00 – Joint field tours with landowners & growers attending WesMin Field Day including Regional Clone Trial, Herbicide Trials, and MN efforts to establish a loan fund for growing poplars.
12:00 – Box Lunch
1:00 - 4:30 – Bus tour including visits to private farms growing poplars in plantations and agroforestry applications and Champion research sites.

Meeting Registration Form

Name:

Address:

Phone/e-mail:

If you wish to give a talk on Wednesday afternoon, please indicate the proposed title: _____

Number of people attending @ \$40/ person = \$____
enclosed (\$45/person after August 11th).

Please send registration to:

Richard B. Hall, Secretary/Treasurer

Department of Forestry

251 Bessey Hall

Iowa State University

Ames, Iowa 50011

Phone: (515) 294-1453; Fax: (515) 294-2995

e-Mail: rbhall@iastate.edu

Hotel reservations can be made by calling the Alexandria Holiday Inn at 1-320-763-6577 or their national reservation toll free number 1-800-HOLIDAY and tell them you are with the Poplar Council group. The room rate is \$52.95 plus tax, single or double occupancy.

IRRIGATION MAINTENANCE GUIDE LINES: Part II

by

Burt Aronoff

Toro Ag/Drip In Irrigation Company

The following is second of a two-part series – a guide to mid-season irrigation maintenance procedures. It is meant to be used as a help guide and not intended to be an all-inclusive manual.

Maintenance Procedures

Irrigation systems have unique and individual problems depending on water quality issues. We will discuss the more common problems and general solutions in this newsletter.

Now that your irrigation system is up and running it may be time to do some maintenance checks to be assured your system is operating at maximum performance. Remember, a well-maintained system will not only perform longer and to the manufacturers specifications but will also allow you to sleep at night knowing fertilizers, water, etc. are being distributed equally throughout your system.

The first step is to check the flow gauge or water metering device to see if the total amount of emitters per the zone in operation matches within reason the actual flow on the meter. This will enable you to determine if emitters are clogged or if there is a leak in the system. To find this use the following formula:

$$Q = \text{GPH of emitter}$$

$$L = \text{Total linear feet of drip tubing in zone}$$

$$S = \text{Spacing between emitter in feet}$$

$$T = \text{Total emitters per zone}$$

$$L/S = T$$

$$T*Q/60 \text{ minutes} = \text{GPM of zone}$$

The major manufacturers of inline drip tubing usually have a 93 to 95% uniformity factor so any actual reading of 7% or less of the above calculation would be deemed acceptable.

It is always best to start at the beginning and check your pump station and work forward. Oil should be at the proper levels and pumps should be greased where needed. Air filters and oil filters, spark plugs, Murphy switches etc. all should be looked at and serviced when needed.

Filtration devices both sand media and screen that are automatic should be checked if timing and pressure differential switches are in normal range. Sand separators and other filters should be checked if the screen is not perforated and that there are no blockages in the discharge manifolds.

Algae buildup is probably the most common clogging problem, followed (not in order) by iron, iron bacteria, calcium, magnesium, sulfur and other particle matter such as sand, debris etc. Sediment buildup should be treated immediately and a water-sampling test is recommended.

The first line of defense is the proper filtration for the perceived problem and chemical treatment if needed. Remember that the most automatic filtration devices should be adjusted to back flush at no more than a 7 PSI differential between the inlet and the outlet. Most back flush controllers also have a so many hours basis to back flush as a fail-safe mechanism.

Chlorine is the most widely used chemical agent in the irrigation industry for water treatment. Sulfuric acid is common when it is desired to change pH. Hydrogen peroxide is beginning to see usage as a deterrent to algae and pathogens.

Hydrochloric acid can be used at a rate of about 4 to 5 ppm to precipitate calcium salt blockages.

Chlorine is injected either as a liquid or gas. To determine the ppm of injection that is correct we normally start off injecting small amounts usually 2 to 5 ppm of chlorine and look for a residual of between 0.5 to 2 ppm at the end of the dripper line. If algae, iron or sulfur bacteria is a problem you can hyper-

chlorinate up to 20 ppm in severe cases.

To precipitate iron inject 1 to 2 ppm of hypochlorite for each ppm of iron.

The formula for injecting liquid chlorine is as follows:

For positive displacement injectors:

$$\text{Injection rate (ounces/hour)} = (0.77 * \text{ppm} * \text{GPM}) / \% \text{ of Cl solution}$$

where 0.77 is a constant

ppm is the amount you want to inject
% of Cl solution is written on the label

For proportional injectors:

$$\text{Injection rate (ppm)} = \text{GPM} * \text{ppm} / \% \text{ of Cl solution}$$

Chlorine gas injection formula is:

$$\text{Injection rate (pounds per day)} = \text{GPM} * \text{ppm Cl}_2 \text{ gas} * 0.012$$

where GPM of system

ppm to inject

0.012 is a constant

Sulfuric acid can be injected to change the pH of water. The rate is normally calculated in a testing lab but field tests can be done. Simply fill a 50 to 100 gallon drum with irrigation water and check the pH. The slowly add acid to the water and test the pH and continue adding small amounts of acid to the water slowly agitating the water until the correct pH is obtained and then calculate the ppm.

Hydrogen peroxide can also be injected to remove pathogens and to kill different forms of bacteria including iron and sulfur bacteria.

Besides the traditional chemical treatments there are several other methods that can be tried. Pond water can be aerated. A one-inch line from the pressure side of a pump can be plumbed to help clean screens on the suction line or prefab self-cleaning devices can be purchased from a multitude of manufacturers. Sand separators can be easily installed to remove particulate matter before it finds its way to the main filtering devices.

Copper sulfate or Chlorine can be added directly to

ponds to control algae. Depending on the type of algae or bacteria you would need to add from 0.5 to 42 pounds per million gallons of water.

If you are using surface water some time between mid-July and August you will probably need to take a serious look at chemical treatment. If there are EPA and other regulations in your area then change the auto-flush cycle on the back flush clock to flush every 3 hours or even less and for at least 60 to 120 seconds.

Once again:

- Check your flow meter against your zone calculations.
- Oil and grease your pump and motor.
- Check flushing cycles on filters.
- Chemically treat water, if needed.
- Flush drip lines.
- For automatic systems put clock on 2 minute syringe and make sure each zone is working.
- Flush drip line thoroughly after repair.

The Center for Irrigation Technology and the Irrigation Association both have excellent books and manuals on all subjects of irrigation and fertigation. Their phone numbers are as follows:
Center of Irrigation Technology 209-278-2066
Irrigation Association 703-573-3551

Burt Aronoff can be reached by email at driptape@aol.com
phone: (215) 233-2307; Fax: (215) 233-2607

U.S. DOE INVENTIONS AND INNOVATIONS

U.S. DOE's Inventions and Innovation program provides financial assistance at two levels: up to \$40,000 or up to \$200,000 – depending on the stage of development – for establishing technical performance and conducting early development of innovative ideas and inventions. Ideas that have a significant energy savings impact and future commercial market potential are chosen for financial support through a competitive solicitation process. In addition to financial assistance, the program offers technical guidance and commercialization support to successful applicants. The program is conducted as part of the mission of the Office of Energy Efficiency and

Renewable Energy. Projects within the focus of the Office of Industrial Technologies – Agriculture, Aluminum, Chemicals, Forest Products, Glass, Metalcasting, Mining, Petroleum, and Steel – are provided special funding consideration. An example of a forest products innovation that has received I&I funding and a list of other funded forest products innovations are described and listed below:

I&I Funded Forest Products Technologies

Cradle Debarker -- Apparatus for Removing Bark from Whole Logs (Dieter Bryce Inc., Gaston, SC)

The invention is a machine designed to remove bark from delimbed tree stems. The stems are loaded into a long trough that contains a series of horizontal and vertical conveyor chains that move and raise the stems so they can be dropped back onto the stems remaining in the pile. The conveyor chains are oriented at a slight angle to the path of the logs so the logs move along the trough. The bark is loosened and removed due to the compressive and shear forces that result from the impact of stems. Abrasion from moving the logs into position to drop onto the pile also contributes to the bark removal. Once the log are debarked, they can be used for veneer, sawed into boards, or can be made into pulp chips. Dieter Bryce, Inc. is developing the technology with the help of a grant funded by DOE's Inventions and Innovations Program. The technology is expected to reduce debarking energy requirements by one-third, reduce damage to logs, and increase production efficiency.



Cradle Debarker™

Other DOE/I&I funded forest products technologies

include:

- Method of Separating Lignin and Making Epoxide-Lignin-Lenox Polymers Limited, Port Huron, MI*
- Delta T Dryer Control System-Drying Technology, Inc., Silsbee, TX*
- Acoustic Humidity Sensor-Sparktech, Duarte, CA*
- Molten Film Paper Dryer-Harvest Technology, Sun Valley, CA*
- High-Efficiency Ozone Generator System-Life Support, Inc., Erie, PA*

Please see the OIT's Inventions and Innovations website (<http://www.oit.doe.gov/inventions/>) for additional details. Inventions and Innovation Program grants are restricted to U.S. applicants, with special consideration provided to individual inventors and small businesses.

NEW PLANTER UNDER DEVELOPMENT

CHR Design Inc has developed a new planter for 2 rows in two different configurations. Those of you who saw the planter in Minnesota or Washington in 1994 will recognize only the conveyor portion. The planting unit has been totally redesigned to insert the tree into the ground with a lineal driver which is stationary while the tree is being planted. It is designed to plant trees that are d to $\frac{3}{4}$ inch diameter and 9 ± 1 inch in length. CHR Design will provide a video tape of the planter in operation as soon as the patent attorneys approve its release.

Anyone interested in additional information can contact:

Clarence H Rail, President

CHR Design Inc

7129 NE 29th St

Ankeny, Ia 50021

Phone: (800) 304-1162 or (515) 964-1162

Fax: (515) 964-5284

CURRENT AWARENESS STUDIES: HARVESTING EQUIPMENT TESTS

Below are three abstracts on recently completed tests of harvesting equipment.

Skidder versus Loader for SRWC Harvesting by Raffaele Spinelli, Bruce Hartsough and Dave Cooper

We compared a Cat 950F and a Cat 528 grapple skidder for moving bunched whole trees to the landing at Simpson Fiber Farms (now Action Tree Farm) in California. The front-end loader was 40 to 60% more productive than the grapple skidder, depending on travel distance. Alternatively, the single loader could both transport trees and handle the landing duties such as moving residues whereas the skidder required a second machine (skidder or small loader) to handle landing activities.

Delimber/Debarker/Chipper Productivity by Raffaele Spinelli, Bruce Hartsough, Steve Pottle and Dave Cooper

Two Peterson Pacific DDC 5000 combines and a Morbark S2155 flail paired with a Morbark EZ 36-60 drum chipper were studied. One of the DDC 5000s operated at Boise Cascade's clonal hybrid poplar farm near Boardman, Oregon, and the other machines at the Simpson Fiber Farms, in eucalyptus stands of seedling origin. The production rate for poplar (23 dry tons per productive hour) was 37% higher than the average for eucalyptus, indicating that poplar is easier to delimb, debark and chip. This is most likely related to the better form of clonal poplar versus seedling origin eucalypts, and the relative ease with which poplar bark is removed from the bole compared with the stringier bark of eucalyptus. The drum chipper appears to have potential for producing pulp chips, and can produce at higher rates than a disk chipper if stems are malformed.

Hybrid Poplar Fiber Recovery with Chain Flail Delimiting/Debarking and Chipping by Bruce Hartsough, Raffaele Spinelli, Steve Pottle and John Klepac

We determined how much wood was potentially available from short rotation hybrid poplar, and how much was actually recovered when trees were chain flail delimited, debarked and chipped. For trees larger than 50 kg total dry weight, potentially recoverable wood averaged 75 percent of total weight of felled trees. Over 95% of this wood was converted into chips. Losses due to breakage by the flails, which show up in the bark discharge, amounted to 0.8 dry kg per tree and were relatively independent of tree

size. Chipper reject wood losses averaged 2.3 dry kg per tree, but increased in almost direct proportion to tree size, from 1.2 kg for 50 kg trees, to 3.2 kg for 120 kg trees. Trees less than 50 kg total dry weight had highly variable amounts of potentially recoverable wood – from 50 to 75 percent of total weight. Because of breakage of small stems by the flail, wood recovery was also relatively low, ranging from 40 to 95%. Most of the wood loss for smaller trees showed up in the bark discharge rather than as chipper rejects. For larger trees, the chipper rejects represent the biggest opportunity for improving the recovery of wood fiber. Sharp chipper knives appear to be important for minimizing losses. Beyond that, it is not clear whether wood in the chipper rejects is the result of bole damage by the flail or chipper design characteristics.

Contact Bruce Hartsough for more information on any of these studies. These studies were supported in part by the USDA Forest Service Southern Research Station under Cooperative Agreement SRS-30-CA-96-058.

AVAILABILITY OF BIOCOST: A SOFTWARE PROGRAM TO ESTIMATE THE COST OF PRODUCING HYBRID POPLAR

A key component in assessing the economic competitiveness of bioenergy crops is an estimation of the cost of producing these crops. BIOCOST is an EXCEL-based software program that can be used to estimate the cost of producing hybrid poplar and switchgrass in seven regions of the United States. The default mode of BIOCOST estimates a full-economic cost, but users can calculate combinations of variable cash, fixed, and owned resource costs to fit their needs. Users can also change yields, land rents, discount rate, prices, and quantities of chemicals, fertilizers, fuel, labor, and seeds (spacing for hybrid poplars). BIOCOST output includes yearly estimates of all economic costs and the calculated net present value cost by acre and by ton. For additional information, please contact Marie Walsh, Oak Ridge National laboratory, P.O. Box 2008, Oak Ridge, TN 37831-6422, 423/576-5607 (voice), 423/574- 8884 (fax), WalshME@ornl.gov (email).

UPCOMING MEETINGS

**Fourth Biomass
Conference of the Americas
*Biomass: A Growth Opportunity
in Green Energy and Value-Added Products*
August 29 - September 2, 1999
Oakland Marriott City Center
Oakland, California, USA**

Conference Overview – The Fourth Biomass Conference of the Americas will be held in Oakland, California. The major themes of the conference address current issues and challenges for biomass and bioenergy.

A special session will address the challenges of electricity deregulation for California's biomass power industry, an issue that is being faced in many areas of the United States. Other sessions will address green electricity, the public issues surrounding biomass and bioenergy, and the role of biomass as a leading energy and materials candidate for mitigating the effects of carbon dioxide emissions on regional and global climate change. A series of presentations will discuss: the sustainable supply of raw material; conversion to biofuels, heat, and power; and the increasing importance of value-added products.

Each of the 25 technical sessions will have five presentations, followed immediately by an interactive poster cluster (short oral summaries by each poster presenter with a question and answer period). The poster clusters will be on display Sunday through Thursday.

For additional information contact:
National Renewable Energy Laboratory
c/o Conferences & Visual Services
1617 Cole Boulevard, MS 1623
Golden, Colorado 80401-3393
Fax: (303) 275-4320
<http://www.nrel.gov/bioam/>

**Annual Meeting of
International Energy Agency (IEA) - TASK 17
*Production of Short Rotation Biomass Crops***

**September 6-9, 1999
Auburn University Conference Center
Auburn, Alabama, USA**

Program Focus – The mission of Task 17 is to meet the needs of bioenergy industries through technical improvement of biomass crop production, by documenting and disseminating information on the potential environmental benefits of biomass crop production systems, and through developing information to enhance market development. The meetings will combine updates of progress and status of bioenergy research and development from member countries, with talks and discussion on issues relating to resource use and conservation of ecological values associated with bioenergy production. Invited talks will emphasize water, carbon, and biodiversity issues. Tours will include herbaceous crops research and ongoing field studies of switchgrass production and combustion (co-firing with coal). David Bransby, agronomist with Auburn University, and staff from the Southern Research Institute will discuss technical and economic prospects and issues in electric power production from switchgrass.

September 6 Monday

1:00 - 5:00 – Introductions and Agenda (Lars Christensen, Lynn Wright, Sandy McLaughlin)
Country Reports
6:00 - 8:00 – Informal reception

September 7 Tuesday

8:30 - 5:00 – Country Reports; Philippine Report; Full Scale Implementation In Europe - Report; Combi-farming; Biodiversity Issues Discussion.

Resource Utilization Issues: Talks on water use efficiency, carbon taxes, and the implications for bioenergy crops; Also carbon storage by herbaceous energy crops and discussion of sustainable management of bioenergy crops.

Field Tour of Auburn University Bioenergy Field Research

Dinner and entertainment at the dog races

September 8 Wednesday

8:00 - 5:00 – Tour of switchgrass production fields

and discussion of harvest and handling issues, tour of co-firing test facility. The switchgrass tour will include a 200 acre planting with demonstrations on harvesting and handling switchgrass for use in co-firing applications. This will be followed by a tour of the combustion test facilities of the Southern Research Institute, a centralized research institute serving the electric power industry. Testing methods for co-firing switchgrass and coal, results from co-firing test burns, and prospects for larger scale utilization of switchgrass for power generation will be discussed.

Group dinner (IEA- covered) along the return trip to Auburn.

September 9 Thursday

8:00 - 12:00 – Country Reports; Business meeting; and Adjournment

Reservations/Lodging – A block of rooms is being held at the Auburn University Conference Center under the name “IEA Workshop”. The nightly rate is \$66.96 (tax included) for a single room. For reservations call (334) 821-8200 or 1-800-228-2876 by August 7, 1999.

Registration – While there is no conference registration fee, participants will be expected to pay for lodging and one evening meal. Please notify Wilma McNabb if you plan to attend.
Phone: (423) 574-8029; Fax: (423) 576-9939
Email: wmx@ornl.gov

Biofuels Feedstock Development Program Subcontractors and Cooperators' Workshop October 12–15, 1999 Holiday Inn Alexandria, Minnesota

October 12 Tuesday

7:00 - 9:00 – Registration and Social at Holiday Inn

October 13 Tuesday

8:00 - 8:30 – Registration & Continental Breakfast

Opening Remarks and Reports (Janet Cushman moderator)

8:30 - 8:40 – Welcome from WesMin - Dean Schmidt

8:40 - 8:50 – Welcome from BFDP/ORNL - Janet Cushman

8:50 - 9:10 – Update on DOE's Fuels Development - Sara Sprague

9:10 - 9:30 – Update on DOE's Biomass Power Program

9:30 - 10:00 – Break

Environmental Sustainability (Virginia Tolbert moderator)

10:00 - 10:10 – Opening remarks and overview of task - Virginia Tolbert

10:10 - 10:30 – Environmental Perspectives - Elizabeth Peelle

10:30 - 10:50 – Corn Stover - Jim Schepers

10:50 - 11:10 – Chemical Fate Study - Hobi Perry

11:10-12:20 – Lunch

Economic Modeling and Analysis (Marie Walsh moderator)

12:20 - 12:30 – Introduction - Marie Walsh

12:30 - 12:50 – POLYSYS and CRP perspective - Daniel Ugarte

12:50 - 1:10 – Forest products and POLYSYS - Peter Ince

Linking DOE Bioenergy Programs with other State, Local and Industrial Programs (Mark Downing moderator)

1:30 - 1:50 – Overview of cost estimates -Mark Downing

1:50 - 2:10 – State of Minnesota legislature

2:10 - 2:30 – State workshops - Phil Badger

2:30-3:00 – Break

Overview of Woody and Herbaceous Crops Research

3:00 - 3:30 – Herbaceous Crops Research - Sandy McLaughlin

3:30 - 4:00 – Woody Crops Research - Jerry Tuskan

October 14 Thursday

8:30 - 10:30 – Collaborators' Small Group Sessions

10:30 - 4:00 – Field tour to Roshalt Farm, Poplar plantations (Box lunch during the tour)

5:00 – Social Hour at Holiday Inn

6:00 – Banquet at Holiday Inn or alternative

October 15 Friday

8:00-12:00 – Collaborators' Small Group Sessions – switchgrass Research; woody crops research; environmental research; and market development

9:30 - 10:30 – Break

12:00 - 1:00 – Buffet Lunch at Holiday Inn

1:00 - 2:00 – Speaker(s) of general interest

2:00 - 3:00 – Summary Comments from Small Group Sessions

IPC 2000**21ST SESSION OF THE INTERNATIONAL
POPLAR COMMISSION OF FAO**

Portland, Oregon

September 24 - 30, 2000

Poplar and Willow Culture:

Meeting the Needs of Society and the Environment

Hosted jointly by the USA and Canada

For additional information contact:

Jud Isebrands

USDA Forest Service

North Central Research Station

Forestry Sciences Laboratory

5985 Highway K

Rhineland, Wisconsin 54501

Tel: (715) 362-116; Fax: (715) 362-1166

email: jisebran@newnorth.net

Jim Richardson

Poplar Council of Canada

1876 Saunderson Drive

Ottawa, Ontario K1G 2C5

Tel: (613) 521-1995 Fax: (613) 521-1997

email: jrichardson@on.aibn.com

**JOB POSITION AT
OAK RIDGE NATIONAL LABORATORY**

Position – Oak Ridge National Laboratory is seeking an engineer with knowledge of agriculture and forestry equipment and experience in systems analysis to develop efficient feedstock supply systems for bioenergy applications.

Responsibilities – The successful candidate will start by evaluating existing equipment and harvesting/handling/delivery procedures for biomass feedstocks. The work will include development of models to describe existing and proposed systems. The candidate will work in collaboration with farmers, foresters, equipment manufacturers, and end-users to conceive and design new equipment (if needed) and to seek ways to optimize the cost-effectiveness of supplying a variety of types of biomass feedstocks to users. The job also includes planning, marketing, and managing collaborative research projects. The work will be conducted as part of a multi-disciplinary, multi-institutional program effort involving other U.S. National Laboratories, The U.S. Department of Agriculture, universities, and the private sector.

Qualifications – The job requires training at MS or PhD level in agriculture or forestry engineering in the areas of power and machinery and supply system logistics. High consideration will be given to candidates for a post-doctorate position, but candidates with more experience seeking a permanent position will also be considered. Systems analysis and modeling training or experience would be desirable. Preference will be given to candidates with training or experience relevant to a wide variety of agricultural crops, forestry crops and harvesting residues. Excellent oral and written communication skills, creative thinking ability, excellent interpersonal skills, willingness to work in a multi disciplinary team and frequent travel are required. Organizational, planning, marketing, and networking skills are expected. Proficiency with computers, PC Windows-based systems, Web and Internet systems, and commonly used software is needed for job performance. An appreciation of, or training in, economics and farming practices is desired. Candidates with a record of publications and professional activities will be viewed favorably.

Qualified applicants are invited to send a current resume and a list of 3 or more references by September 15, 1999 to the attention of Lynn L. Wright. Bldg. 1059, MS 6422, Oak Ridge National Laboratory, Oak Ridge, TN 37831 or e-mail to wrightll@ornl.gov. To learn more about the position, you may call Ms. Wright at 423-574-7378.

More information about the Oak Ridge National Laboratory, the Environmental Sciences Division, and the Bioenergy Feedstock Development Program is available at:

<http://www.ornl.gov>
<http://www.esd.gov>
<http://www.esd.ornl.gov/bfdp>

ORNL, a multipurpose research facility managed by Lockheed Martin Energy Research Corp for the U.S. Department of Energy, is an equal opportunity employer committed to building and maintaining a diverse work force.

SUSTAINING SPONSORS

The following companies listed below are sustaining sponsors of the SRWC-OWG. Their contribution to the Working Group is most appreciated.

American Cyanamid Company
B. B. Hobbs Company
Boise Cascade Corporation
Toro Ag/Drip-In Irrigation Company
Morbark Industries Corporation
Netafim Irrigation

Additional industry sponsors are sought. Your company can become a sustaining sponsor of the Working Group with a annual contribution of \$500. These funds will be used to collect and distribute information, to enhance home-page activities, and to sponsor the biennial workshops and topical conferences. Each company that becomes a Sustaining Sponsor will be recognized on the letterhead of the Working Group, and on all publications including workshop proceedings and newsletters. In addition, complimentary annual memberships will be provided to up to five individuals within the company. If your company would like to become a Sustaining Sponsor, please contact Bruce Hartsough, Biological & Agricultural Engineering, University of California, Davis, CA 95616. Phone: (530) 752-8331, Fax: (530) 752-2640, brhartsough@ucdavis.edu.

SRWC - OWG WEB PAGE

The web page for the Working Group is listed below:
<http://www.woodycrops.org>

Here are a few useful websites:

The association of the American Pulp and Paper Association – <http://www.tappi.org/>

New Forests –
<http://www.wkap.nl/journalhome.htm/0169-4286>

Society of American Foresters –
<http://www.safnet.org/index.html>

Forest World Journal – <http://www.forestworld.com/>

Canadian Journal of Forest Research –
<http://www.cisti.nrc.ca/cisti/journals/rjfor.html>

Virtual forestry library –
<http://www.metla.fi/info/vlib/Forestry/Organization/com/index.htm#S>

American Forest and Paper Association –
<http://www.afandpa.org/index.html>

If you have articles, publications, announcements, and other information that would be of interest to other members, please send to:

Bob Perlack
Phone: (423) 574-5186; Fax: (423) 574-8884
Email: perlackrd@ornl.gov

REMINDER ON MEMBERSHIP DUES

Since the inception of the Working Group, administering sponsors have provided financial sponsorship of the Group. The current mailing list includes nearly 400 recipients. To help defray costs, nominal membership dues are \$20 per year. Membership services will include a newsletter, access to the membership list, and development of conferences and workshops. Members will also receive the proceedings of the biennial conferences

and reduced registration at these conferences.

For membership services:

Bob Perlack
Oak Ridge National Laboratory
Post Office Box 2008
Oak Ridge, TN 37831-6205
Phone: (423) 574-5186, Fax: (423) 574-8884
perlackrd@ornl.gov

For dues information:

Jim Shepard
NCASI
Post Office Box 141020
Gainesville, FL 32614-1020
Phone:(352) 377-4708 ext 227, Fax: (352) 371-6557
jshepard@ncasi.org

For all other inquires:

Dr. Bruce Hartsough
Biological & Agricultural Engineering
University of California
One Shields Avenue
Davis, CA 95616
Phone:(530) 752-8331, Fax: (530) 752-2640
brhartsough@ucdavis.edu

MEMBERSHIP REQUEST FORM

Name _____

Position _____

Company/Organization _____

Address _____

Phone _____

Fax _____

e-mail _____

Areas of Responsibility _____

SRWC Interests _____

G Will **G** Will not allow this information to be
published/placed on homepage.

Please complete and return to:

Jim Shepard
NCASI
P.O. Box 141020
Gainesville, FL 32614-1020

Please make your check payable to NCASI (memo: SRWC
Working Group).
