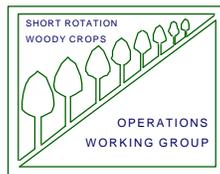


# Short-Rotation Woody Crops Operations Working Group NEWSLETTER

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**Number Six**

**December 1999**

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## MINUTES OF THE SRWC-OWG STEERING COMMITTEE

SRWC Operations Working Group  
Steering Committee Meeting  
August 18, 1999  
Holiday Inn, Alexandria MN

### *Members and representatives present:*

Tim Volk (for Larry Abrahamson), Mark Coleman (for John Blake), Bruce Hartsough, Tom Houghtaling, Joe Battista (for Evan Hughes), Roy Merritt, Harry Quicke, Jim Shepard, Ron Stoffel, Bryce Stokes, Lynn Wright

### *Guests:*

Don Reimenschneider (USFS North Central Research Station, Rhinelander WI), Raffaele Spinelli (Wood Research Institute, Florence Italy)

### *1. Minutes*

Minutes of the August 24, 1998 meeting in Vancouver WA were approved.

### *2. Preliminary planning for the Third Conference*

The meeting will be held in Syracuse, NY. Tim Volk and Larry Abrahamson will be co-conference chairs, and will rely on Continuing Education at the University to handle the arrangement details. After a discussion of possible conflicting or dovetailing meetings (Council on Forest Engineering, September 11-14 in Kelowna BC; International Poplar Commission, September 24 - October 3 in Vancouver WA; Bioenergy 2000, October 15-19 in Buffalo NY), the Tuesday-Friday of October 10-13 was tentatively selected. Two days of this will be devoted to a field trip, the rest to presentations and other activities.

### *3. Administrative Sponsor activities*

The committee reaffirmed the commitment of each organization to provide an annual contribution of \$5000, cash or in-kind services. The USFS, NCASI and ORNL have been providing at least that much each year. Due to budget limitations and priorities, EPRI has not been able to provide support during the last couple of years. Bruce Hartsough will check with Evan Hughes to see if the future prognosis is better, and if there would be interest in taking on the newsletter or other aspects of the Working Group. (Follow-up: Evan indicated that EPRI would probably be able to contribute both cash and in-kind support for the coming year.)

### *4. Current membership and financial status*

Jim Shepard supplied membership figures: 72 paid members and 7 Sustaining Sponsors so far this year, versus 162 paid members and 6 Sustaining Sponsors in 1998. The big difference is due to a conference being held every other year (last year and not this year); conference registrants are "forced" to become members. Our Sustaining Sponsors are:

American Cyanamid Co.  
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Boise Cascade Corp.  
DuPont Ag Products  
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Jim's financial report showed that we are back in the black! Current bank balance is \$4250.04, although this includes a loan of \$2640.11 from NCASI to make up our temporary deficit. The committee thanked Jim for the much-needed temporary support and recommended that we return the loan amount to NCASI. After all the transactions from the 1998 conference were finalized, the summary figures were:

Total Income (less bus refund)	\$12,477.15
Total Expenses (less bus refund)	<u>\$17,344.29</u>
Bottom Line	-\$4,867.14

The expenses do not include the costs of publishing and distributing the conference proceedings. American Cyanamid has offered to cover these expenses, and their associate, Dudnyk Public Relations, is currently finalizing the proceedings format. The proceedings will be distributed to all members/conference attendees, and also to all libraries of universities with recognized forestry programs in the US.

#### 5. Future budgeting issues

Bryce Stokes has arranged for a \$5,000 contribution to the Working Group from the USDA Forest Service Washington Office, to be routed via Don Reimenschneider through the North Central Research Station. It will be earmarked for planning and executing the 2000 conference. Don is working on an additional \$5,000 each from the North Central and Southern Stations for the following year.

#### 6. New activities

The committee felt that we should expand our dissemination of new information, especially via timely updates in the Newsletter. In recent issues, Burt Aronoff wrote valuable articles on irrigation systems, and Bruce Hartsough provided some harvest test results. Roy Merritt offered another useful irrigation article. Lynn Wright mentioned that

multiple products are being considered for SRWC, and it would be good to have a person who would lead the information gathering in that area. (Follow-up: Pat Moore has consented to act as key contact for SRWC products.) Another area of importance is "supply logistics," i.e. the whole string of activities from land purchase through delivery of material to the end-user.

#### 7. Other business

New steering committee members are needed to replace Bruce Upchurch (who left Union Camp/International Paper to join University of Georgia), Jim Tillman (who left Supertrak) and Gail Simonds (who left Westvaco to join the ministry).

Due to an unforeseen increase in work commitments, Lynn Wright indicated that she would be unable to step in as chair of the Working Group for 2000 and 2001. Possible nominees for incoming chair were discussed, and Bruce will contact these individuals. (Follow-up: Victor Ford, Research Scientist at Westvaco's Appalachian Forest Research Center was nominated and approved by the Steering Committee to replace Gail Simonds as industry member from the eastern US, and to become chair for 2000 and 2001.)

Submitted by:

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### **GUIDE LINES FOR DRIP IRRIGATION AND FERTIGATION OF PINES AND HARDWOOD**

by  
**Ian Barr**  
**Netafim Irrigation, Inc.**

#### **Dripperline Selection**

The idea behind drip irrigation is to create a uniform and continuous strip of moisture along the

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dripperline. Once this continuous wetted strip is achieved, the spacing of the plants along the dripperline does not matter.

The factors that affect the spacing are the soil type and the dripper's flow. Once the continuous wetted strip is achieved, economical considerations influence the selection of the most agro-economical alternative.

Generally, there are three possible spacings that are commonly used for conditions like ours:

- 36 inches - 0.92 GPH
- 40 inches - 0.92 GPH
- 36 inches - 0.61 GPH

### Fertigation Program

It is very important to have a soil and water analysis before establishing any fertigation program. It can save money, decrease groundwater pollution, and increase the efficiency of fertigation. Some elements like calcium and magnesium can be more economically and conveniently provided through the application of dolomite rather than in a liquid form. Later, these elements may be reduced, or completely eliminated from the program, based on possible significant concentrations in the irrigation water.

Until soil and water analysis become available, here are some guidelines to consider: Dr. Klaus Steinbeck from the University of Georgia has calculated the total amount of fertilizers and the ratio between the various elements for coppiced trees of Sweetgum and Sycamore. His basic formula is as follows:

Element	lbs/acre/yr
N	150
P	30
K	60
Ca	60
Mg	20
Mn	0.5
Zn	1.5
Cu	0.3

Since there is very little background in this field, we intend to base our recommendations on our considerable experience with intensively grown woody plants, i.e., fruit trees, ornamental and shade

trees, citrus groves. Normally, the removal of potassium from the soil by stone fruits is twice that of nitrogen. Based on data taken from the U.S. Forest Service Research Paper SE-17 (March 1965) entitled *Weight and Nutritional Content of the Above Ground parts of Some Loblolly Pines*, by Louis J. Metz and Carol G. Wells, we have assessed the ratio between the different elements as follows:

$$\begin{matrix} \text{N} & : & \text{P} & : & \text{K} & : & \text{Ca} & : & \text{Mg} \\ 7 & : & 1 & : & 7 & : & 7 & : & 2 \end{matrix}$$

The above formula generally fits a wide range of woody crops. That is the reason we would like to recommend this formula to your particular study. Another practical reason is that the translation of this formula to a commercial liquid fertilizer that can be chemically blended and stay clear and stable will be as follows:

Element	N	P <sub>2</sub> O <sub>5</sub>	K <sub>2</sub> O
Percentage (w/w)	8	2	8

The liquid fertilizer 8:2:8 is very popular and readily available from any fertilizer dealer.

Using common practices in the industry to date as a basis, we would like to propose 150 lbs/ac of N as a starting point. Once further data are acquired, based on fertilization trials, biomass accumulation, etc., this figure can be adjusted accordingly.

### Notes

- To ensure proper fertigation, please pay attention that the fertilizer contains only three elements - N, P, and K. Since calcium and Magnesium are incompatible with Phosphorous, they can be applied separately as pre-plant, as described previously. Later, the Phosphorous might be eliminated for a certain period and either Ca or Mg (or both) can be injected, all based on soil and water analysis.
- Micro elements can be applied in a dry fertilizer, together with pre-plant application of P and K. These elements move very little through the soil profile. If they were to be applied via the drip system, they might be unavailable in the first year. If the soil and water analysis are not available, our recommendation

is as follows:

- 1.0-1.5 ton/ac of Dolomite
- 100 lbs/ac of P (preferred as superphosphate)
- 150 lbs/ac of K (as muriate of potash or potassium sulphate if superphosphate is not used)
- 1.5 lbs/ac of Zn (Dr. Klaus Steinbeck)
- 0.5 lbs/ac of Mn (Dr. Klaus Steinbeck)
- 0.3 lbs/ac of Cu (Dr. Klaus Steinbeck)

If we choose to have the minor elements injected together with the liquid fertilizer, our recommended rates will be Mn - 0.0125%, Zn - 0.0125%, Cu - 0.0009%, Mo - 0.0006%, B - 0.002%, Fe - 0.03%. An application of 25 - 50 lbs/ac of N should be considered as a pre-plant application.

3. The liquid fertilizer can be derived from:

- Ammonium nitrate
- Phosphoric acid (drip grade)
- Potassium chloride
- E.D.T.A. Chelated, Mn, Zn, Fe, Cu, Mo, and B (if desired)

4. The fertilizer will be injected evenly throughout the season and in every irrigation. It will begin after the system is completely pressurized and will end, for the duration\*, before the system shuts off.

\*The same "non-fertigation" injection period before and after the fertigated period.

5. The proposed fertilizer 8:2:8 will weigh approximately 10 lbs/gal. Every 1.25 gal will contain 1 lb of N.

6. The fertilizer injections should not be postponed more than a week due to continuous rains. If it rains and there is no need to irrigate, then by the end of the week, the weekly amount of fertilizer should be injected. First the pressure has to build up, then the fertilizer should be injected, followed by a flush of not more than 15 minutes. This process should not take more than 45-60 minutes.

7. Monitoring the fertility in the root zone can be done by using soil water samplers that will be placed in exactly the same way as tensiometers. They can be read once per week using a field kit. The main factors that normally can be checked are the E.C. and the nitrate levels.

## Irrigation Program

The peak demand of water consumptive use of these trees is estimated as 1.25 inches/week for a full, mature forest.

Based on a comprehensive study and our experience, we assume that in our case the peak demand in the first year will be about 0.5 inches, which means about 3.5 gal/tree/day.

The total water holding capacity in a typical sandy loam soil is about 1.3 inches/foot. Assuming a root zone diameter of 5 feet in the first year and 12 inches depth of the main feeder root system - the total water holding capacity of this volume will be about 16 gallons.

We believe that we can deplete 50% of the available water without causing any water stress. This means about 8 gal/day. Matching the figures of the peak water consumptive use (3.5 gal/day) and the allowed water depletion (8 gal/day) will give us the interval between irrigations, which in this case will be on a daily basis.

Since we have a flow of about 1.84 GPH/tree during peak demand, we should irrigate for 2 hours on a daily basis. Based on these calculations the following irrigation schedule is proposed:

### Irrigation schedule

Month	Gal/tree/day	Interval (days)	Hours of run
Apr	2	4	4
May	2.5	3-4	4-5
Jun	3.5	2	4
Jul	3.5	2	4
Aug	3.5	2	4
Sep	2.5	3	4

## Notes

1. This Table does not take into account actual rainfall. Thus, rain should be taken into account and be subtracted from the water application. Each tree has an available surface of about 20 ft<sup>2</sup>. Thus, 1 inch

of rain is equal to about 12 gal/tree. It is common to estimate an average rain efficiency of 75%, which means only 9 gals/tree available. This means that during peak demand the 1 inch rain will provide 3 days of consumptive use, thus results in skipping 3 days of irrigation. The same 1 inch rain in the beginning of the season will postpone the irrigation 4-5 days. A 0.5 inch rain will result in skipping 2-3 days in April or 1-2 days in June or July. Anything below 0.2 inches should not be taken into consideration at all.

2. Another tool that can help tune-up the irrigation schedule are tensiometers. We strongly recommend using tensiometers in the following manner: two stations per block with each station having three tensiometers at a depth of 6, 12, and 18 inches. The tensiometers should be placed next to a healthy, good looking tree about 12 inches from the trunk and 8 - 10 inches from the dripper on the dripperline.

3. A new irrigation schedule will be figured for the second year, based on adjustments and experience of the first year and the growth of the trees.

For further information, contact:  
Netafim Irrigation Inc.  
4548 N. Douglas Ave.  
Altamonte Springs, FL 32714  
(407) 788 - 6352  
Fax (407) 862-0259

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## CONTACTS FOR TOPICAL INFORMATION

The Working Group would like to disseminate as much current information as possible to our members. If you have any tests, data, events, etc. that you would like to share through the Newsletter or webpage, please contact the following individuals who have volunteered to be primary contacts in each of the following areas.

☒ Irrigation -  
Burt Aronoff <driptide@aol.com>  
Roy Merritt (813) 961-3621

☒ Fertilization/nutrition -  
Mark Coleman <mcoleman@newnorth.net>

Jon Johnson <poplar@wsu.edu>

☒ Vegetation/pest control  
Harry Quicke <harold\_quicke@py.cyanamid.com>

☒ Harvesting  
Bruce Hartsough <brhartsough@ucdavis.edu>

☒ Products  
Pat Moore <pwmoore@potlatchcorp.com>

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## STUMP TREATMENT AND HARVESTING TRIALS by Pat Moore Potlatch Corporation

At present, Potlatch plans to cut trees so that the stumps are about an inch tall, kill them chemically when cut, then plant between the old rows. Stump extraction has some potential benefits but it is a challenge, it is costly, and there is still the question of what to do with the stumps once they are on the surface. Potlatch has considered using a Meri-Crusher attached behind a stump lifter to rip the stumps into tillable piece sizes or recover the fiber if markets allow. Potlatch built and tested a prototype stump lifter, based on two 5-foot-diameter flat steel discs. The discs were opposed, could be tilted at 30 to 45 degrees from the vertical and angled outward at up to 8 degrees from the travel direction. The initial trial was unsuccessful. Potlatch consulted with a sugar beet digger manufacturer and an ag-engineering design firm and now have a redesign for the unit, but have not done any work on it yet. With the poor regional wood chip market at present, it is not economical to recover the stump for fiber, but that may change over time. Potlatch also tested a Savannah bedding plow for tilling stumps in place. It was successful -- leaving the stumps in place and allowing them to rot is considered effective and less costly.

Potlatch conducted delimiting/merchandising trials this spring. Merchandising, for solid wood markets, consisted of bucking out 16-foot logs. A Danzco pull thru delimeter, Denharco slide boom processor and a Valmet single-grip harvester was tested. These trials

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were not definitive, with only about 100 trees per system, but they gave indications of which type of equipment was most effective for the 5-yr-old trees that were trialed. The slide boom was the slowest, at 1.8 trees/min, merchandising was not efficient and delimiting quality was poor with slabbing. The pull thru delimeter was surprisingly effective and probably the most cost-efficient, at 2 trees/min, and produced limited slabbing but no merchandising. (Potlatch is considering this type of delimeter or the delimiting module from a double grip harvester for the delimiting line, if they choose to go with a fixed processing installation.) The most efficient was the small single-grip harvester attachment. The feed wheels on the harvester did a nice job of loosening the bark also, but whether debarking of poplar with a single-grip harvester is cost-effective is yet to be determined.

Potlatch is also investigating the use of an articulated felling head (with intermittent disc saw) that would allow cut trees to be loaded directly into wood wagons by the felling machine. They have talked to a manufacturer about designing a purpose built wood wagon -- a prime mover with front bunks that would pull a single-bunk trailer. The wood wagons would transport trees to a landing, or on off-highway roads to a fixed processing installation.

For further information, contact:  
Pat Moore  
Potlatch Corporation  
Boardman, OR

Ed. -- Pat Moore has offered to coordinate the Working Group's awareness effort on wood products/utilization. If you have any experience with solid wood or other higher-valued products from SRWC and would like to share it with the group, contact Pat at <pwmoore@potlatchcorp.com>.

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## **WHOLE TREE ENERGY PROJECT APPROVED**

The state of Minnesota's Public Utility Commission gave approval on December 20, 1999 for building a biomass power project that would rely heavily on farm grown hybrid poplars. The project, using Whole

Tree Energy™ technology, has been approved within the range of 25 to 75 MW. The location of the facility is expected to be in or near St. Peter, MN and the Minnesota River. A 50 MW facility, the size preferred by the project developers (EPS/Beck Power), could require establishment of about 55,000 acres of hybrid poplars if the Minnesota mandate for 75% reliance on closed-loop biomass is met with woody crops. Closed-loop wood facilities are allowed to use other wood sources in early years if plantings to supply the facility are being established. The highly integrated technology is depending on newly designed planting and harvesting technology, high yielding poplar trees, no chipping costs, reduced handling costs, efficient drying techniques, and innovative combustion designs to keep the power production costs within acceptable limits. Technologies and varieties of hybrid poplar trees developed jointly by the DOE Bioenergy Feedstock Development Program and the USDA Forest Service will be relied upon heavily to achieve the desired yields and costs. It is likely that project support and evaluation technical assistance will be sought by the project developers from ORNL.

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## **UPCOMING MEETINGS**

### **21<sup>ST</sup> 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

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1876 Saunderson Drive  
Ottawa, Ontario K1G 2C5  
Tel: (613) 521-1995 Fax: (613) 521-1997  
email: jrichardson@on.aibn.com

**BIOENERGY 2000:  
MOVING TECHNOLOGY TO THE  
MARKETPLACE**

*October 15-19, 2000  
Adam's Mark Hotel  
Buffalo New York*

*Hosted by the  
Northeast Regional Biomass Program*

The deregulation of the electric industry, the tightening of environmental regulations, the emergence of new technologies, and the recognition of the importance of agriculture in meeting our energy needs provide an exciting backdrop for the first bioenergy conference of the twenty-first century. Bioenergy 2000 is the ninth biennial conference hosted by the U.S. Department of Energy's Regional Biomass Energy Program.

America's worsening dependence upon foreign oil and our increasing awareness of the threat posed by global warming have stimulated a significant redirection of our national R&D; efforts to investigate the potential for alternative transportation fuels. Dedicated short-rotation woody and herbaceous crops, invigorated by genetic engineering, continue to show promise as economically viable feedstocks for power plants and for conversion to ethanol in our automobiles, and light and heavy vehicles. Gasification, pyrolysis and fuel cell technologies demonstrate new promise for commercial utilization in the early decades of the twenty-first century.

Information about Bioenergy 2000 can be found at <http://www.nrbp.org/bio2000.htm>

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**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.

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**INFORMATION**

**SRWC - OWG Web Page:**  
<http://www.woodycrops.org/>

**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](mailto: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  
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**For all other inquires:**  
Bruce Hartsough; Biological & Agricultural  
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Davis, CA 95616  
Phone:(530) 752-8331, Fax: (530) 752-2640  
[brhartsough@ucdavis.edu](mailto:brhartsough@ucdavis.edu)

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MEMBERSHIP REQUEST FORM

Name \_\_\_\_\_

Position \_\_\_\_\_

Company/Organization \_\_\_\_\_

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SRWC Interests \_\_\_\_\_

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**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).

