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The Quarterly is open to papers of merit dealing with all aspects of plant growth regulation and plant growth regulators. Manuscripts will be reviewed by two or more reviewers. Membership in the Society is not required. Newsworthy items, viewpoints and abstracts of theses and dissertations are also published as space permits.

Effects of a Root Barrier and Localized Fertilizer Application on Root Growth of Young Peach (*Prunus persica*) Trees[1]

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Abstract: The response of 2-year-old peach trees to localized application of fertilizer and a physical barrier in soil was measured in greenhouse studies. Pots had a split root design so that the root system was partitioned at the junction with the stem. Half the pot was not treated and the other half received one of four treatments at one location, 43 to 46 cm from the root collar: 1) soil volume restricted with polypropylene nonwoven fabric (FAB); 2) fertilizer alone (FER, 8N-5.2P-26.6K); 3) FAB+FER; and 4) untreated control (UTC). Minirhizotrons were used to measure root growth over time at four distances from the root collar in each pot half. In FER and FAB+FER, fertilizer was applied once each wk until 16 wk after planting (WAP) when root growth was evident at the treatment location. Then all treatments were fertilized daily from 17 to 19 WAP at the same root location. At 17 WAP, the number of new roots increased significantly in soil that received FER and FAB+FER compared with FAB and UTC. Root growth was enhanced to a lesser extent in soil not receiving FER or FAB+FER on the treated side (i.e. near the treated soil). Root growth on the untreated pot half did not change in response to fertilization or fabric. Thus, weekly localized applications of low rates of fertilizer enhanced the peach tree capacity to respond to daily localized applications of fertilizer. However, the greatest number of roots grew at 43 to 46 cm from the root collar where localized FAB+FER was applied. This treatment also resulted in the most rapid response of shoot growth to daily fertilization. This differential root and shoot response to fertilization and a root barrier may affect efforts to control peach tree size with root restriction and other orchard floor management practices.

Nomenclature: *Prunus persica* (L.) Batsch

Additional index words: growth regulation, root length density, specific root length

INTRODUCTION

There is an economic incentive to control peach tree growth since small trees can be managed to reduce inputs of labor and pesticides (Bassi et al., 1994). Peach tree size is controlled most often by pruning, but pruning is labor intensive and may cause adverse effects by creating wounds (Boland et al., 1994; Elfving, 1988; Kappel and Bouthillier, 1995). Tree size can also be changed by manipulating root systems (Boland et al., 1994; Chalmers et al., 1981; Ran et al., 1992; Williamson and Coston, 1990). Reducing root volume by cutting part of the root system and installing nonwoven porous fabric in soil generally reduced shoot growth of peach trees but this suppression was inconsistent over time (Rieger and Myers, 1997). Nonuniform patterns of root distribution in soil may be a potential cause of variation in tree response to root treatments. Also, nonuniform response of the root system to root treatments is possible. Restriction of a whole root system with a physical barrier limited total root growth but

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increased root density near the barrier (Ferree et al., 1992). These experiments demonstrated that root pruning or complete root restriction will alter growth of whole peach root systems and distribution of roots. It is less clear how partial root restriction will affect root growth when pruning is not used. Such conditions may occur when trees are planted in fabric-lined trenches to control shoot growth as described by Williamson et al. (1992).

Root growth and root density can be modified by nutrient availability as well as barriers which limit root volume. Plant roots can grow through a nutrient-poor soil and then branch and proliferate when they encounter soil enriched with nutrients (Drew et al., 1975). Agrell et al. (1994) and Brouder and Cassman (1994) found dry weight and N allocation increased to roots, and root branching increased, in response to localized soil enriched with nitrate. Increased root growth in nutrient-rich soil may result in less growth in other parts of the same plant (Agrell et al., 1994; Adalsteinsson, 1994; Brouder and Cassman, 1994). It is likely that the combination of increased fertility with a physical barrier in a localized soil will increase root growth in that soil but the response of other roots and of the shoot is less predictable. It may be possible that the combination of a root growth barrier and selective application of fertilizer could be used to manage root growth of peach trees and enable control of shoot growth. However, effects of localized root treatments on growth of untreated parts of the root system as well as the shoot may have critical impact on such management efforts. The objective of this research was to evaluate the growth of a peach tree root system at three locations relative to a localized site of fertilizer application and a physical barrier in the soil.

MATERIALS AND METHODS

Split Pot Design. Twenty-eight 'Sentry' peach trees budded on 'Lovell' seedling rootstocks (2-year-old, 1-cm diameter above the root collar) were weighed and planted in pots with a split-root design. Soil used was a Hagerstown silt loam (fine, mixed, mesic Typic Hapludalf). The root system of each tree was partitioned at the junction with the stem into two groups that were visually equal and half the roots of each tree were placed into separate halves of the inverted "Y-shaped" pot (approximately 5 liters soil per half, Fig. 1). The split-root pot consisted of plastic pipes (10.3 cm inside diameter) with two 45-degree elbows connected to form each arm of the "Y". Each half of the pot was 63 cm long with a flange at 46 cm from the root collar. One pot half was watered but did not receive fertilizer or fabric (untreated half). The other pot half was watered but also received fertilizer, fabric, or both (treated half). In pots receiving fabric, an 8 oz polypropylene nonwoven fabric (Reemay, Old Hickory, Tenn.) was placed in a cross-sectional plane across the pipe at the flange on the treated half, thus dividing the pipe. Drainage holes were spaced along the bottom of each pot half to prevent excess water from accumulating. After planting, pots were watered to field capacity and then both pot halves were watered daily (100 ml) through holes at 29 and 51 cm from the root collar and water (200 ml) was applied each month to the top of each pot. When planted, roots were to the 29 cm depth but not the 43 to 46 cm depth where fabric was installed and where fertilizer was applied. No attempt was made to maintain a specific soil water potential but pots were weighed at least once every 2 wk to confirm that changes in total weight were similar among treatments. Average weight of pots for the 24 wk period was 17.8 ± 0.5 kg per pot. It is possible that trees had not received

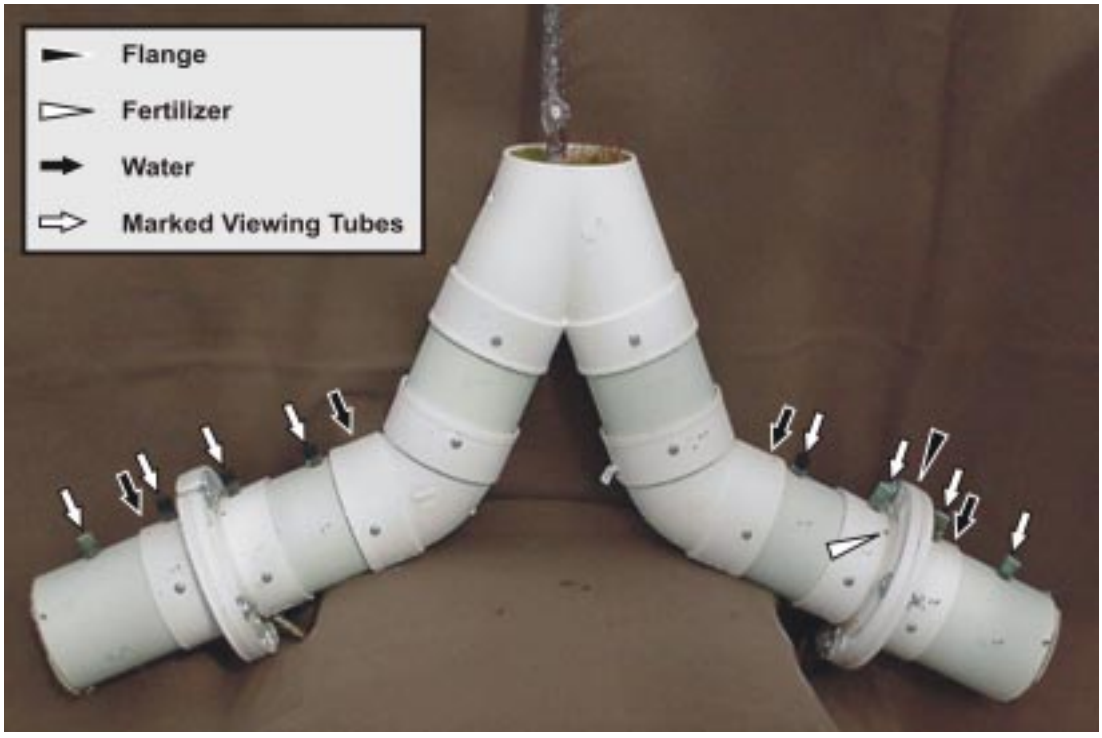

Figure 1. Split pot design: flange with fabric (46 cm from the root collar), access for fertilizer (43 cm from the root collar), access for water (29 and 51 cm from the root collar), and root view tubes (34, 42, 48, and 56 cm from the root collar).

optimal water but trees never wilted. Small amounts of localized water was used since the hypothesis being tested was that roots proliferate where soil resources were abundant and the small, localized applications would create wetter, more fertile patches that would contrast with unwatered and unfertilized soil.

Trees were grown in the greenhouse with a 16-h photoperiod under high pressure sodium lights (22 ± 3 °C temperature, 80% relative humidity, and 400 µE/m²/sec PPFD). The experiment was designed to grow trees with limited resources from the soil and to allow peach tree roots to grow through soil until they encountered a patch of moist or fertile soil. In other experiments, barriers to tree root growth have been installed after cutting portions of the root system or by compacting roots into small containers. We wanted to evaluate tree root growth as roots grew to an enriched patch as may occur under heterogeneous soil conditions in the field. Ten ml of a 10 mM NO_3 solution (Chem-Grow 8N-5.2P-26.6K; Hydro-Gardens, Inc., Colorado Springs, Colo.) was applied as a gentle stream to soil with a syringe through holes at 43 cm from the root collar on the treatment half of selected trees. Small volumes of water were used in this "point localization" application to avoid simulation of solution culture and to increase the probability of nutrient movement by normal diffusive and convective processes (Robinson, 1994). Ten ml water was applied to trees not receiving fertilizer. Fertilizer was applied weekly to selected trees starting 6 weeks after planting (WAP) and ending 16

WAP. During this time, roots grew to the treated area and root response to enrichment was observed. Fertilizer was applied daily to the treatment half of all trees for 3 weeks, from 17 to 19 WAP. Weekly fertilization resumed for the FER and FAB+FER treatments and FAB and UTC were not fertilized from 20 to 22 WAP.

Treatments and Data Analysis. The design of the experiment was a factorial arranged in a randomized complete block with four single-tree treatments per block, and 7 replicates. Blocking was associated with location in the greenhouse. The four treatments applied to one pot half per tree were: 1) fabric only (FAB); 2) no fertilizer and no fabric - untreated control (UTC); 3) fabric and fertilizer (FAB+FER); 4) fertilizer only (FER). The second pot half was not treated. Main treatment effects were determined with analysis of covariance, using tree weight as the covariable (SAS Institute, 1988). Separation of individual treatment effects were based on selected t-tests, after analysis of covariance (SAS Institute, 1988).

Tree Measurements. Root counts were measured each week by inspecting samples of the pot cross-sectional area. When the pots were constructed, eight marked tubes (1.3 cm diameter x 10.3 cm long) were inserted through the pot (four tubes per half) at 34, 42, 48 and 56 cm from the top of the pot where the root collar was located (Fig. 1). Each tube was a minirhizotron which sampled 16% of the cross-sectional area (13.3 cm^2) of the pot and was used to measure root growth. Roots were counted and recorded by position for each minirhizotron. The number of roots that intersected the minirhizotrons were counted each week with an industrial fiberscope (Model FS100, Riechert Fiberoptics, Southbridge, Mass.) attached to a digital video recorder (Sony DV Handycam). A library of each week's measurements allowed comparisons over time. However, some roots died and consequently, counts represent populations of roots. Such counts do not represent mass but a relative measure of root number and of root demographics. New shoot length of three shoots, one from a different branch per tree, was measured each week.

Twelve trees (3 replications) were harvested 24 WAP and leaf number and dry weights and stem dry weights were measured. Leaf N concentration was measured on a 10-leaf subsample per tree (LECO FP 228 nitrogen determinator, St. Joseph, MI). The remaining trees were to be used in another experiment. Roots plus soil from each half were cut into sections from the root collar as follows: root collar to 16 cm (top of pot, only one soil sample); 16 to 31 cm; 31 to 36 cm; 36 to 41 cm; 41 to 46 cm; 46 to 51 cm; 51 to 56 cm; and 56 to 63 cm. Soil was measured for total N (NO_3^- and NH_4^+) as described previously (Preusch et al., 2002). Soil was washed from the roots with a hydropneumatic elutriation system (Gillison's Variety Fabrications Inc., Mich.; Smucker et al., 1982). Root length was measured with CIAS image analyzer (Jandel Scientific, Calif.). Roots were then dried at 80 °C for 2 days and dry weights were measured.

Root length density (RLD) and specific root length (SRL) were calculated for each soil section of the treated and untreated pot halves. RLD is the length of root per unit volume of soil and represents root growth and potential to access soil resources. SRL is the length of root per unit of root dry weight and represents the tree dry weight partitioned to root elongation. Of particular interest was root growth and soil nutrient status 41 to 46 cm from the root collar where fertilizer and fabric barrier treatments were installed.

RESULTS

Weekly measurements. Fewer than 2 roots per 10 cm^2 were counted at each minirhizotron until 15 WAP (data not shown). Number of roots increased at 17 WAP, coinciding with daily fertilization at 42 cm from the root collar (Fig. 2). From 17 to 22 WAP, the greatest number of roots were in the FAB+FER at the point of localized treatment. Fewest roots were counted in the UTC and FAB treatments and an intermediate number of roots were counted in the FER treatment at this location. Number of roots at other distances from the root collar increased from 2 to 6 per 10 cm^2 between 17 and 22 WAP but numbers did not differ due to treatment (data not shown). In all treatments, shoot length increased until 7 WAP when growth slowed, although buds had not set. Shoot growth resumed only in FAB+FER trees at 21 WAP, 4 wk after daily fertilization began (data not shown).

Final harvest. Peach trees that received weekly fertilizer (FER and FAB+FER) increased new root length and weight in the treated pot half to 3493 cm and 2.9 g compared with 1831 cm and 1.4 g in control. In these fertilized trees, root length and weight increased most in the 41-46 cm segment of the treated pot half where roots probably encountered increased soil nutrients and fabric barrier associated with treatment at 43 cm from the root collar (Table 1). RLD in soil segments that were 41-46 cm from the root collar of trees receiving FER and FAB+FER increased 150% and 475%, respectively, compared with control trees. Generally, specific root length was greatest in control trees, but significant differences were only found in untreated soil of the treated pot half (Table 1).

Fertilizer increased shoot weight by approximately 61% (Table 1). Although FAB+FER most stimulated the resumption of stem growth

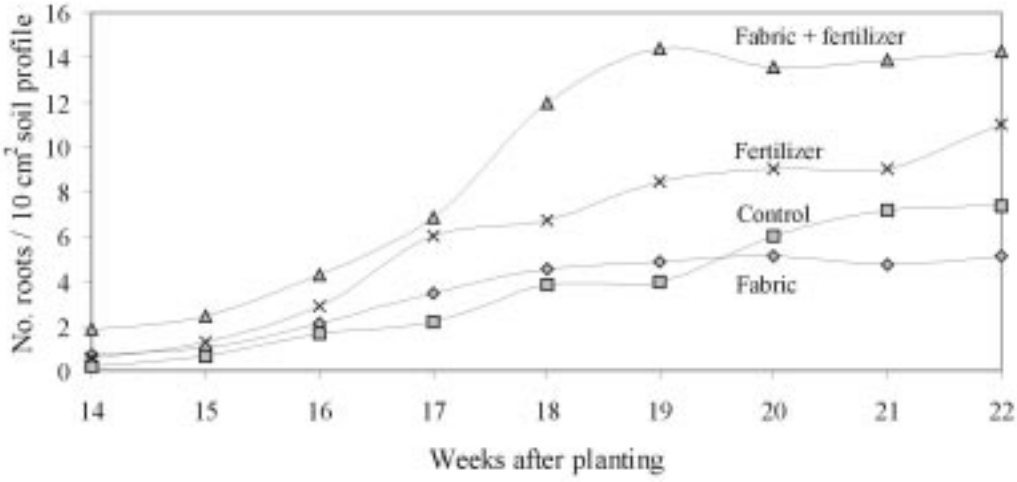

Figure 2. Number of peach roots counted each week (14 to 22 weeks after planting (WAP)) at 42 cm from the root collar in the treated pot half. Root counts are presented for fertilized (FER), fabric (FAB), FAB+FER, and untreated control trees. An LSD (P = 0.05) of 3.7 was determined for treatment differences during this time based on the pooled variance.

Table 1. Root length density (RLD) and specific root length (SRL) of different sections of 3-yr-old peach trees grown in a greenhouse in pots with a split-root design. In one pot half treated soil had a fabric barrier (FAB), fertilizer (FER), and FAB+FER applied, 41 to 46 cm from the root collar. The other pot half was not treated.

Treatment	RLD (cm root / cm^3 soil)			SRL (cm root / g root d.w.)			Shoot growth (g)
	Treated pot half		Untreated pot half	Treated pot half		Untreated pot half	
	Treated soil	Untreated soil	Untreated soil	Treated soil	Untreated soil	Untreated soil	
Control	0.8	1.1	1.1	2335	2353	2561	5.2
FAB	1.2	1.3	1.3	1831	1128	1348	5.0
FER	2.0	2.0	1.4	1228	1132	1089	8.4
FAB+FER	4.6	2.1	1.4	1423	1059	1315	8.5
ANOVA				P > F			
FER	0.01	0. 47	0.85	0.11	0.02	0.10	0. 69
FER	0.04	0. 21	0.61	0.65	0.06	0.24	0. 05
FAB x FER	0.09	0.48	0.87	0.41	0.05	0.11	0.50
t-tests				Probability T ≥ t			
FAB v. FER	0.20	0.24	0.26	0.13	0.49	0.27	0.01
FAB v. FAB+FER	0.01	0.06	0. 29	0.23	0.20	0.47	0.01
FER v. FAB+FER	0.04	0.42	0. 40	0.26	0.35	0.28	0.47

after daily fertilization began, total shoot weight at harvest was only greater due to fertilizer (Table 1).

Soil N (NO_3^- and NH_4^+) did not differ due to treatment by 24 WAP. Total N ($\mu g \cdot g^{-1}$ dry soil) was 16.0, 17.3, 16.4, and 18.7 for FAB, UTC, FAB+FER, and FER, respectively. Soil N may have been absorbed by the tree or leached from the soil. Leaf N concentration was 1.7, 1.8, 2.0, and 2.3% d.w. in the FAB, UTC, FAB+FER, and FER, respectively. The sufficiency range for peach tree N concentration in the mid-Atlantic region is 2.5 to 3.4% N (Crasswell and Greene, 1995) and N deficiency may partly account for limited shoot growth.

DISCUSSION

In this experiment, peach roots proliferated in the soil receiving FER and FAB+FER. Root proliferation in localized nutrient-enriched soil does not occur in all species and can vary with other components of the soil environment (Fitter, 1994; Robinson, 1994). For example, nutrient enrichment of soil stimulated root growth of Scots pine (*Pinus sylvestris* L.) and Norway spruce (*Picea abies* (L.) Karst.) but Douglas fir (*Pseudotsuga menziesii* (Mirb.) Franco) was unaffected (George et al., 1997). Factors such as soil compaction or dryness also will affect development and distribution of a root system. Water availability and competition interacted so that loblolly pine (*Pinus taeda* L.) roots responded to increased N only when there was no competition from other plants (Ludovici and Morris, 1996). In peach, root density can increase in response to localized irrigation in an orchard (Tagliavini et al., 1996). The impact of soil patches enriched with nutrients on root growth of peach is less clear. Many studies have evaluated effects of root restriction on growth in peach (Ferree et al., 1992; Richards, 1978; Richards and Rowe, 1977a, 1977b; Rieger and Myers, 1997; Vizotto et al., 1997; Williamson et al., 1992) and a homogeneous root nutrient supply has been a research component of these studies but, to our knowledge, localized root proliferation in response to enriched nutrient patches has not been previously reported in peach.

At final harvest (24 WAP), RLD had increased in the soil with localized fertilization on the treated pot half and to a lesser extent in the rest of the soil on the treated pot half. However, RLD did not increase in untreated soil in the untreated pot half, indicating that peach roots grew in response to fertilizer patches and growth stimulation did not generalize across the whole root system. The nature of signal transduction by which roots perceive nutrient patches and then respond with growth has been investigated in other species. Hormones such as cytokinins have been implicated as positive elictors in this signal transduction (Samuelson et al., 1992), possibly in response to increased ion transport across membranes (Clarkson and Touraine, 1994). The role of hormones in peach root response to patches of soil enriched in nutrients has yet to be determined. Modification of root hormones, genetically, culturally (e.g. with nutrient and barrier manipulations), or by PGRs, could provide a novel approach to regulating root, and possibly shoot growth of peach trees.

RLD was 1.2 cm/cm^3 at the site of the fabric barrier, which was significantly greater than the RLD at the same distance from the root collar in control trees. RLD was greater (2.0 cm/cm^3) if fertilizer was applied and greatest if both fabric and fertilizer were applied (4.6 cm/cm^3). This interaction suggests that the fabric may have increased the microenvironmental concentration of fertilizer to further stimulate root growth or the fabric may stimu-

late root growth by a completely different mechanism. Several researchers have reported or speculated that physical barriers influence hormone metabolism and flux from peach and other species (Richards and Rowe, 1977a, 1977b; Williamson et al., 1992). Abscisic acid and ethylene have increased in roots of plants grown with root restriction (Ismail and Davies, 1998; Peterson et al., 1991). Increased ethylene production coincided with initiation of adventitious roots (Peterson et al., 1991). If nutrient enrichment and physical barriers induce alternate physiological pathways within the root then the different sites of action could be targeted for manipulation or management with possible synergistic effects on growth.

FER and FAB+FER increased root length and weight on the treated side of the pot. Root length and weight of these treatments were not changed on the untreated side. This indicated that the stimulation of growth in part of the root system was not accompanied by less growth in another part which has been observed in some species (Robinson, 1994). Internal reserves or environmental supplies of nutrients thus appeared sufficient to support nutrient foraging by some roots without overall suppression of root system growth. Resumption of shoot growth was significantly delayed compared with the rapid root growth response to fertilization in the FAB+FER treatment. This time lag may be due to root nutrient needs being fulfilled before nutrient levels were adequate for shoot growth. Increased N supply to part of the root system also can elicit a secondary response or signal that alters nutrient allocation patterns by increasing root sink strength (Agrell et al., 1994). Root demand as a carbon sink may take precedence over shoot sink demand for carbon until a threshold of root growth is achieved. Alternatively, substantial root growth may have been necessary to produce hormones to stimulate shoot growth.

Orchardists require vegetative shoot growth to support fruit production but excess vegetative growth can adversely affect fruit quality by inhibiting color development. Previous research demonstrated that confinement of root systems can reduce shoot growth of peach trees (Myers, 1992; Ran et al., 1992; Richards and Rowe, 1977; Williamson and Coston, 1990; Williamson et al., 1992). In this experiment, peach roots responded quickly (i.e. within a week) and proliferated most in soil where localized application of fertilizer and fabric barrier was made. Portions of a peach root system were stimulated by localized applications of fertilizer and this root growth preceded shoot growth. In larger, more actively-growing trees than those used in this experiment, combinations of selective application of fertilizer and root restriction could enable management of peach shoot growth. However, temporal differences between root and shoot growth and spatial differences in growth within a root system, as seen in this experiment, may affect the success of such an approach to manage peach tree size in the field.

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PLANT GROWTH REGULATION SOCIETY OF AMERICA
First Summer Steering Committee Meeting
Park Plaza Hotel, Executive Boardroom
Vancouver, B.C.
August 2, 2003
4:00 p.m.-8:00 p.m.

Attendees: Eric Curry (1st Vice President), Richard Dunand (Business Manager), Louise Ferguson (2nd Vice President), Wayne Mackay (President), Sonja Maki (MAL-3), Ricardo Menendez (MAL-2), Jeff Norrie (MAL-1), Ed Stover (Secretary), Tom Tworkoski (Executive Officer).

President Wayne Mackay called the meeting to order at 4:15 p.m.

OLD BUSINESS
Minutes of the Annual Winter Steering Committee Meeting
1. Moved and unanimously approved that we dispense with a reading of the minutes and approve them as already published in the *Quarterly*.

Public Relations Committee Report- Sonja Maki
1. The new PR brochure was sent out to people who have attended meetings but are not members and the PGRSA website was updated.
2. First newsletter of 2003 was 50 pages and placed on web as pdf. In the near future guidelines for authors will be included on website.
3. A publicity flyer for 2004 meeting will be distributed at 2003 meeting.

2003 Program Committee Report- Eric Curry
1. We were informed that the 2003 meeting had come together well, with 100 people participating in the meeting, and one hundred thirty people registered including accompanying people, making it likely that the annual meeting would cover its costs.
2. The board expressed their pleasure and gratitude in meeting once again with the Japanese Society for the Chemical Regulation of Plants, and said they are looking forward to an excellent meeting.

2004 Meeting Report- Louise Ferguson
1. The board was updated on 2004 meeting preparations. A contract has been signed with the Charleston Riverview Hotel which will host our 2004 meeting.
2. Contracts have also been signed for a pre-conference tour to a historic ship (the Hunley) and for a reception at the Old Exchange which is an interesting historic building.
3. Several symposia are in development for the 2004 meeting

NEW BUSINESS

Results of Annual Elections- Ricardo Menendez

1. Sonja Maki has been selected as 2nd Vice President
2. Bob Belding has been selected as member-at-large but Dennis Sheppard with Syngenta was a close runner-up.
3. Three positions are coming open next year

Business Managers Report- Richard Dunand

1. Net assets of PGRSA remain strong at $122,655 as of 12/31/02, essentially unchanged from 2001. As treasury strips have matured they are being converted into short term CDs. Holdings in the Money Market fund have been greatly reduced, and transferred to checking, since it is paying higher returns.
2. Account balances as of June 30, 2003 look stronger than recent years but many annual meeting expenses are pending. Value of our Index Mutual Fund shares has increased as the market has begun to recover.
3. A separate Membership Services Budget was presented: although it is currently positive for 2003, as in previous years we will be substantially negative for the entire calendar year. The net membership services budget for 2003 is projected at minus $7,000 to $8,000.
4. PGRSA membership for 2003 is 150 which is slightly down from previous 3 years, slightly down in all categories except basic North American members.
5. The board discussed various options for continuing to sustain PGRSA and increase membership.
6. We are pleased to report that Bayer Crop Science is now the official sponsor of the Graduate Student Presentation Awards.

2005 Site Selection Report- Ricardo Menendez

Ideas for a 2005 venue were briefly discussed as a prelude to more detailed discussion in the Second Summer Steering Committee Meeting

Editor's Report- Caula Beyl

1. Caula discussed the status of 2003 *Quarterly* issues
2. The board discussed the value of maintaining the *PGRSA Quarterly*. Currently the cost of publishing the Quarterly is about the same or somewhat greater than annual membership fee at $40/year/member. Various options were discussed.

Executive Officers Report- Tom Tworkoski

The board was apprised of legal issues concerning our annual registration with the state of Missouri and a small discrepancy between our report of assets to IRS and our official records from ASG. We were assured that these were minor and would shortly be reconciled with no cost to the society.

Other business- Tom suggested that the PGR handbook be updated. Several board members commented on the high visibility and importance of a PGR handbook. Jeff Norrie and Ricardo Monendez have agreed to form an exploratory committee to consider updating the handbook.

Sustaining Members Breakfast
August 5, 2003

In attendance:

Wayne Mackay	Nenand Filajdic-Valent BioSciences
Tom Tworkoski	R. Mark Beach -Valent BioSciences
Louise Ferguson	Ricardo Menendez-Valent BioSciences
Tom Davenport	Tom Irwin -Acadian
Ed Stover	Michelle Bell- SePro
Richard Dunand	Jeff Dobbs-Olympia Hort
Duane Greene	Maurice DeBenedetto-Dormex
Eric Curry	Jeff Norrie-Acadian Seaplants
Sonja Maki	Albert Liptay-Stoller
Ed Stover	Sherry LeClere-Stoller
Gary Stutte	Jerry Stoller-Stoller
Caula Beyl	Jeff Brown-BASF
Neil Yorio, Dynamac	Gary Custis-PBI Gordon
	Sid Siemer-Siemer Assoc.

Wayne Mackay opened discussion at 7:45 a.m. by describing the steering committee's decision to cease hardcopy publication of the *Quarterly*. He indicated that a CD-ROM of the *Quarterly* may be sent out each year. The proceedings would continue to be printed as a hard copy for the present. Wayne announced an agreement to link our website with on-line publications of the Japanese Society for the Chemical Regulation of Plants. Discussion ensued that was very supportive of on-line publication of the *Quarterly*. Eric Curry indicated that all PGRSA publications since 1973 are on CD and will be made available for posting on-line. Several participants commented on increased visibility for PGRSA that will result from on-line publication. Tom Tworkoski asked industry members what they would like to see in the *PGRSA Quarterly*. Gary Stutte & others suggested that changes in PGR company personnel, label changes, EUP's, section 18s, job announcements, research findings, and problems warranting research may be published in the *Quarterly* or on-line. Jeff Brown suggested that industry could post opportunities for research collaboration, where companies are seeking university or contract researchers, as well as a forum for discussion on PGR's and biotech that would permit "end users" to indicate their needs and interests. Sonja Maki proffered the idea of a membership profile section. Jeff Norrie suggested that company profiles should be included. Jeff Brown asked whether a meeting attendance list with contact information could be included. Gary Stutte suggested a listserv could be included for discussion of PGR related issues. Jerry Stoller asked whether the listserv could be used to request consulting help. There was broad agreement that on-line publication and related activities should be handled as a for-fee professional activity rather than be conducted on a voluntary basis by a PGRSA member. Richard Dunand agreed that he would contact ASG to see if they can accommodate this need. Eric Curry announced the International Plant Growth Substances Assoc. meeting in Canberra Sept 2004; information for corporate members was left at the registration desk by Dick Pharis.

PLANT GROWTH REGULATION SOCIETY OF AMERICA
Annual Business Meeting
Park Plaza Hotel
Vancouver, B.C.
August 5, 2003

Called to order by President Mackay at 12:40pm

A motion was made that 2002 minutes be accepted as published Vol. 3 of 2002 *PGRSA Quarterly*. No amendments were offered from the floor. Eric Curry thanked the members of the Japanese Society for the Chemical Regulation of Plants for their participation as well as the members of PGRSA and their guests.

Caula Beyl presented the following awards:

Graduate Student Travel Awards	Melanie LeClerc Kumala Dewi
Young Scientist Award	Jose Pablo Morales-Payan

Wayne Mackay presented the **Bayer CropScience Outstanding Presentation Award** to Xiguan Gao for his oral presentation "Theobroxide stimulates lipoxygenase activity and level of jasmonic acid in short-day plant," which was coauthored by C. Minani, A. Kiura, H. Matsuura, and T. Yo

The **Best Poster Award** was presented to Yung Su Kim for his poster "Brassinosteroid-induced gravitropism is mediated by brassinasteriod receptor in Arabidopsis roots," which was coauthored by T.W. Kim, J. Choo, S.C. Chang, J.S. Lee, and S.K. Kim.

The **Valent BioSciences Outstanding 2002 Paper Award** was presented by Ricardo Menendez to Shuju Bui & William Chaney for their paper: "Treatment of mature trees and seedlings with gibberellin synthesis inhibitors affects electron transport in leaf mitochondria of parents and progeny."

Ricardo Menendez presented the newly elected members of the executive committee:
Dr. Sonja Maki, of Carleton College was elected 2nd Vice President
Dr. Robert Belding, of Rutgers University was elected Member at Large-1

The Business Manager's Report was presented by Richard Dunand. He indicated that the financial status of PGRSA is sound and thanked the members, sustaining members and companies providing funding for awards and support for our annual meeting. Dr. Dunand noted that travel awards and young scientist awards are $500 each and are provided through general membership funds. Membership remains stable at 150-160 people. We had excellent attendance in the annual meeting as we always do when meeting jointly with JSCRP.

Caula Beyl presented the **Editor's Report**. Dr. Beyl reminded membership that hard copy publication of the *Quarterly* will cease after 2003. She noted that we will continue to accept manuscripts for on-line publication, she specifically requested review articles and research reports as refereed publication as well as news items that will receive wide readership. Dr. Beyl further reminded members that there are no page charges and that on-line publication will facilitate inclusion of color photos and figures.

Tom Tworkoski presented the E**xecutive Officer's Report**, indicating that we have sustained $120,000 – 130,000 in assets over the last 5 years and that the Society is in excellent financial shape. Assets of this magnitude provide a financial cushion in case we are forced to default on a meeting contract due to unexpected and dramatic events. Some of these funds may also be used for the newly initiated revision of the PGR handbook. Dr. Tworkoski outlined the benefits of converting to on-line publication the membership. He also apprised the membership of Sonja Maki's efforts to create a new brochure for PGRSA and encouraged everyone to attract new members.

President Wayne Mackey thanked VP Eric Curry for his efforts in coordinating the annual meeting and expressed his pleasure in working with the PGRSA steering committee and membership.

Louise Ferguson & Robert Beede presented a colorful introduction and welcome to the 2004 meeting August 1-4 in Charleston, SC. Surely, if this delightful taste of the old-South is any indication, this will be a wildly successful PGRSA meeting.

Outgoing PGRSA President Wayne Mackay transferred the presidency of PGRSA to Eric Curry. Eric presented a plaque to Wayne Mackay in appreciation of his excellent service and contribution to PGRSA as VP & Program Chairman in 2001-2002 and President in 2002-2003.

Shannon Curry was presented an award in recognition of her Hazardous Duty at the Registration Desk throughout the 2003 meeting.

Eric Curry provided some introductory autobiographical anecdotes and expressed his belief that diverse approaches to plant growth regulation and diverse skills make our organization strong, healthy, and vital. He expressed that PGRSA has a diverse blend of powerful talents which makes our organization particularly useful. He expressed his pleasure in working with PGRSA over the coming year, special thanks to JSCRP and his hope that he can continue to advance our society. The meeting was adjourned at 1:22 p.m.

PLANT GROWTH REGULATION SOCIETY OF AMERICA
Second Summer Steering Committee Meeting
Park Plaza Hotel, Executive Boardroom
Vancouver, B.C.
August 6, 2003
2:30 p.m. - 5:00 p.m.

Attendees: Eric Curry (President), Caula Beyl (Editor), Richard Dunand (Business Manager), Louise Ferguson (1st Vice President), Wayne Mackay (Past President), Sonja Maki (2nd Vice President), Ricardo Menendez (MAL-2), Jeff Norrie (MAL-1), Ed Stover (Secretary), Gary Stutte (Past president), Tom Tworkoski (Executive Officer).

President Eric Curry called the meeting to order at 2:30pm. Eric thanked Wayne Mackay for his assistance in assembling and conducting the 2003 meeting.

2005 Meeting Discussions- Sonja Maki
1. Joann Chaney (Bill Chaney's wife and former travel coordinator for Purdue) of Global Tracks described how she might help us in organizing and conducting our annual meeting.
2. She indicated that she can often get better rates at hotels than can be obtained by people not familiar with planning meetings, and she offers to help PGRSA at no charge or fee, as she would be paid by the hotel.
3. Discussion ensued, and the consensus was that the steering committee was inclined to hold the 2005 meeting in San Diego (or other city in California) or a Mexican site such as Puerto Vallarta. Sonja indicated that she will explore San Diego, Quebec City, and Mexico with Davis, CA as a fall-back position.

Public Relations Committee Update- Sonja Maki
1. Sonja indicated that the publicity committee has spent $250 of the $800 approved for PR brochure development and requested approval to print an updated brochure with info. on the 2004 meeting.
2. The committee voted to approve expenditure of up to $800 for both printing and mailing.

Sustaining Membership Committee Report- Wayne Mackay
1. The value to PGRSA of our sustaining members was stressed.
2. Various potential sustaining members were discussed, with agreement that they would be contacted.

2004 Meeting Update- Louise Ferguson
Program draft so far, coordinators and topics:
Sonja Maki – Improving Delivery of PGRs
Ed Stover- Looking down the Transduction Chain after PGR Application
Hanne Rasmussen – PGR's in Tree Architecture
Ray Kessler & Brian Whipker – PGR's in the Ornamental Industry
Ron Smith & Tom Tworkoski – PGR's and Biomass Partitioning.

Summary of 2003 Meeting- Eric Curry

1. There were 123 registrants and the meeting expenses will be covered by the registrations paid
2. Four people submitted abstracts but did not attend. Proposed that the body of the abstract on–line, be eliminated and be substituted with NOT PRESENTED or WITHDRAWN (if notified).
3. Participants in the meeting were from U.S., Canada, Japan, Korea, Australia, Denmark, Germany, Mexico, Trinidad, Saudi Arabia, China, Israel, and Italy.

Nominating Committee was formed for 2004:

Ricardo Menendez (chair), Louise Ferguson, Wayne Mackay, Ed Stover

Transition to Electronic Publishing –

1. Steering Committee agreed that 1st CD will not be issued until the end of 2004 and will include all 2004 Quarterlies and the Proceedings.
2. The new PGR Handbook will also be placed on a separate CD as well as on-line.

Reaffirmation of Relationship with ASG

1. Richard Dunand indicated that our contract with ASG does not require annual renewal but it is desirable that we consider our relationship each year at our 2nd Steering Committee Meeting.
2. The committee voted to continue our relationship and expresses their approval and satisfaction with their services.

Scheduling Winter Steering Committee Meeting

1. Meeting will be Dec. 6 from 10-6 p.m.
2. The location will be determined by Sonja Maki based on her need for us to see the proposed site for the 2005 meeting.
3. Sonja will advise us as to the location by Oct. 1st.

The meeting was adjourned at 5:00 p.m.

2004 PGRSA

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MEMBERSHIP**	**COST***
Membership for 2004	
U.S./Canada/Mexico	40.00
International	55.00
Student	15.00
Sustaining	500.00
PUBLICATIONS	
Current Proceedings	
U.S./Canada/Mexico	40.00
International	55.00
Back Issues (1979-2001) Indicate Year _____	30.00
Plant Growth Regulator Handbook - 1990	30.00
Chemical Vegetation Management - 1988	40.00
Bioassay Handbook - 1986	20.00
PGRSA Membership Directory - 1999	16.00
PGRSA Quarterly Back Issues	18.00

*All prices include shipping
**All memberships include *PGRSA Quarterly*; Proceedings available at an additional charge.Please make payments in U.S. currency drawn on a U.S. bank. Make checks payable to Plant Growth Regulation Society of America. Send check and this invoice to the address shown above. AmEx, MC and VISA accepted.

PGRSA STEERING COMMITTEE 2003-04

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2003 PGRSA SUSTAINING MEMBERS

Acadian Seaplants Limited - Jeffrey Norrie
Amvac Chemical Corporation - John Immaraju
Bayer CropScience - Jim Collins
BAL Planning Co., Ltd. - Yasuo Kamuro
Dormex Co. USA, LLC - Maurice DeBenedetto
Dynamac Corporation - Gary Stutte
Fine Agrochemicals Ltd. - Steve Wilson
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PBI/Gordon Corp. - Gary Custis
SePro Corporation - Michelle Bell
Stoller Enterprises, Inc. - Jerry Stoller
Syngenta Professional Products - Dennis Shepard
Valent BioSciences Corporation - Prem Warrior

2003 PGRSA ANNUAL MEETING SPONSORS

Acadian Seaplants, Ltd. - Jeffrey Norrie
Dormex Company USA, LLC - Maurice DeBenedetto
Fine Agrochemicals, Ltd. - Steve Wilson
Stoller Enterprises, Inc. - Jerry Stoller
SePRO Corporation - Michelle Bell
Valent BioSciences Corporation - Ricardo Menendez

PGRSA 2004 in Charleston, South Carolina

The 31st Annual Conference of the Plant Growth Regulation Society of America will be held in historic Charleston, South Carolina. Charleston was voted the 5th of top U.S. cities to visit for fun and recreation. In addition to its symposia, a workshop, industry update session, and contributed papers and posters, the conference features a pre-conference tour on Sunday of the Confederate Submarine Hunley, Patriots Point, the aircraft carrier Yorktown, the Submarine Clamagore, destroyer Laffey, the Coast Guard cutter Ingham, the Medal of Honor Museum, and 25 vintage military aircraft. Patriot Point is also a departure point for tours to Fort Sumter.

The conference will be held in the Charleston Riverview Hotel, August 1-4, 2004 and features benefits such as Travel and Best Student Paper/Poster Awards. Meeting updates may be found on the PGRSA website at http://www.griffin.peachnet.edu/pgrsa. For more information about the meeting, topics, or location, contact:

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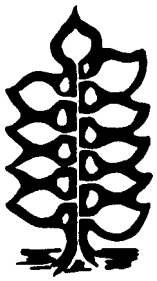

Till We Meet Again

January 14 - 15, 2004
Western Plant Growth Regulator Society
Sacramento, California
Email djbarcel@sbcglobal.net for more information.

July 31-August 4, 2004
31st Annual Meeting of the Plant Growth Regulation Society of America
Charleston, South Carolina
www.griffin.peachnet.edu/pgrsa/events.html

September 20-24, 2004
18th International Conference on Plant Growth Substances
Canberra, Australia
www.conlog.com.au/ipgsa2004

Down the Road

February 19-20, 2004
Plant Responses to Abiotic Stress
Sante Fe, New Mexico
www.keystonesymposia.org

March 23 - 28, 2004
International Society for Horticultural Sciences (ISHS)
Symposium for "Protected Culture in a Mild-Winter Climate"
Orlando, Florida
www.ipgsa.org

May 24-28, 2004
3rd International Symposium on Plant Dormancy:
From Molecular Level to Whole Plant
Wageningen, The Netherlands
www.seedcentre.nl

July 17-20, 2004
American Society for Horticultural Science Annual Meeting
Austin, Texas
www.ashs.org/conferences.html

July 24-28, 2004
American Society of Plant Biologists Annual Meeting
Disney's Coronado Springs Resort & Convention Center
Lake Buena Vista (near Orlando), Florida
www.aspb.org/meetings/pb-2004/

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