Weed Control in Small Fruit (2000)

Tim Miller and Carl Libbey, WSU Mount Vernon

Blueberry studies

1. Herbicide trial. Plots were established near Burlington, WA (Sakuma Brothers, cooperator). Products tested included Visor, Sinbar, Milestone, simazine, and Kerb applied 3/23/99 and 4/10/00. Weed control was evaluated, as was the effect of these treatments on berry yield and fruit size.

2000 results: There was no significant difference in total yield or quality of fruit from treated bushes. General weed control in 1999 and 2000 is listed in Table 12.

Table 12. General weed control in blueberries treated with several herbicide combinations (2000).

		1999 treatments		2000 treatments		
Treatment	Rate	4/27	7/14	5/1	5/31	9/12
	lbs ai/a	----------	%	----------		
Untreated	—	0	0	0	0	0
Visor + Sinbar	0.5 + 1.6	27	70	23	47	45
Milestone + Sinbar	0.5 + 1.6	50	83	90	78	55
Simazine + Kerb	1.6 + 1.0	30	60	63	30	33
Diuron + Kerb	1.6 + 1.0	20	58	50	27	60
Sinbar + Kerb	2.0 + 1.0	43	86	53	47	63
Visor + Kerb	0.75 + 1.0	62	50	53	57	83
Milestone + Kerb	0.75 + 1.0	85	73	93	88	42
$LSD_{0.05}$	—	29	33	31	38	ns

2. Canada thistle trial. Plots were established near Mount Vernon, WA (Mark Erickson, cooperator). Stinger was tested at two rates and two timings (early and late) for the second consecutive season. Early treatments were applied to 2- to 6-inch Canada thistle rosettes (5/5/99 and 4/11/00); late treatments were made to bare soil in 1999 (after stems were cut at the soil surface) and to 6- to 12-inch stems in 2000. Thistle control was evaluated, as was the effect of these treatments on berry yield and fruit size.

2000 results: There was no significant difference in total yield or quality of fruit from treated bushes in 1999. In 2000, however, the high rate applied early significantly reduced blueberry yield. Canada thistle control is listed in Table 13.

Table 13. Canada thistle control in blueberries treated with several rates and timings of Stinger (2000).

		Canada thistle control		Blueberry yield		50-berry wt.	
Rate	Timing	4/27/99	9/12/00	1999	2000	1999	2000
lbs ai/a		---------- % ----------		------- kg -------		----- kg -----	
0.125	early	95	51	263	1632	84	76
0.25	early	98	38	204	924	84	79
0.125	late	65	86	316	1575	88	77
0.25	late	86	97	219	1882	93	81
Untreated	—	0	0	202	1733	86	83
$LSD_{0.05}$	—	10	41	ns	479	ns	ns

Strawberry studies

1. Established strawberry trial. Plots were established near Coupeville, WA (Jerry Bell, cooperator). Products tested included Visor, Goal, Prowl, Blazer, Cobra, Milestone, simazine, and Devrinol applied in late winter to dormant, 1-year-old 'Puget Reliance' strawberries (2/18/00). Crop injury and weed control were evaluated, as was the effect of these treatments on berry yield and fruit size. This trial will be repeated on the same site in 2000-01.

2000 results: There was no significant difference in total yield of fruit from treated plants. Crop injury, general weed control, and 50-berry weight are listed in Table 5. The Milestone + Prowl and Visor + Goal treatments resulted in the smallest berries, but this may have resulted as much from poor stand as from actual herbicide injury.

Table 5. Weed control from dormant-season herbicide treatments (2000).

Treatment	Rate	Crop injury 4/3/00	Weed control 4/3/00	50-berry weight
	lbs ai/a	%	%	(g)
Visor	0.5	8	82	652
Goal	0.38	18	91	578
Prowl	2.0	10	19	599
Blazer	0.38	1	84	735
Cobra	0.38	9	88	579
Milestone	0.5	38	94	613
Simazine	1.0	3	23	822
Devrinol	4.0	5	38	690
Visor + Goal	0.38 + 0.25	19	61	546
Visor + Prowl	0.38 + 1.5	9	74	631
Visor + Blazer	0.38 + 0.25	13	94	661
Visor + Cobra	0.38 + 0.25	14	95	600
Prowl + Goal	1.5 + 0.25	38	85	591
Prowl + Blazer	1.5 + 0.25	10	75	678
Prowl + Cobra	1.5 + 0.25	15	93	653
Milestone + Prowl	0.25 + 1.5	40	96	684
Milestone + Visor	0.25 + 0.38	21	97	499
Handweeded	—	1	96	598
Untreated	—	1	0	709
$LSD_{0.05}$	—	9	19	137

2. Newly-planted strawberry trial. Plots were established at WSU Mount Vernon (planted 5/23/00). Products tested included Spartan, Visor, Goal, Prowl, Blazer, Cobra, Milestone, Dual Magnum, Valor, and Devrinol applied pre- and post-transplant to 'Totem' and 'Redcrest' strawberries. Crop injury and weed control were evaluated (June and August), as was the effect of these treatments on leaf area and number of runners and daughter plants (mid-August).

2000 results: Results from pre-transplant treatments are given in Table 6; from post-transplant treatments in Table 7. No injury or difference in weed control were obvious at the June evaluation, but several treatments resulted in excellent late season weed control. Of the treatments providing a similar level of weed control as the handweeded check, only Spartan (either pre- or post-transplant) resulted in strawberry growth statistically similar to handweeded strawberries. Other "soft" treatments included Prowl + Blazer and Valor (pre). 'Totem' produced more runners than did 'Redcrest,' but other growth parameters were similar between the two cultivars (data not shown).

Table 6. Weed control and strawberry growth after treatment with several pre-transplant herbicides (2000).

Treatment	Rate	Weed control 8/8/00	Number of Leaves	Number of Runners	Number of Daughters	Leaf area
	lbs ai/a	%	per plant	per plant	per plant	cm^2
Spartan	0.25	84	11.9	6.8	6.0	1383
Goal + Visor	0.5 + 0.38	76	9.8	4.2	3.0	922
Goal + Visor	0.25 + 0.5	83	9.8	4.2	2.9	988
Prowl + Visor	1.0 + 0.38	75	10.9	4.3	2.5	962
Prowl + Blazer	1.0 + 0.5	58	10.7	5.9	5.7	1305
Prowl + Cobra	1.0 + 0.5	23	10.3	4.3	3.9	1055
Prowl + Goal	1.0 + 0.38	55	10.2	4.8	3.9	1121
Milestone	0.5	96	7.4	1.8	1.0	458
Milestone + Goal	0.5 + 0.25	97	7.6	2.4	1.2	532
Valor	0.07	64	11.9	5.9	4.8	1328
Handweeded	—	100	11.2	6.3	6.1	1414
Untreated	—	0	6.3	1.8	1.3	537
$LSD_{0.05}$	—	23	2.1	1.1	1.3	282

Table 7. Weed control and strawberry growth after treatment with several post-transplant herbicides (2000).

Treatment	Rate	Weed control 8/8	Number of Leaves	Number of Runners	Number of Daughters	Leaf area
	lbs ai/a	%	per plant	per plant	per plant	cm^2
Visor	0.38	68	11.9	4.6	3.4	1127
Visor	0.5	78	11.0	5.1	4.7	1197
Prowl	1.5	51	9.8	4.1	3.3	888
Visor + Dual Magnum	0.25 + 0.25	78	10.3	4.8	4.1	1119
Visor + Blazer	0.25 + 0.25	43	9.3	4.3	3.7	1000
Visor + Cobra	0.25 + 0.25	46	9.1	4.1	3.5	978
Visor + Dual Magnum + Prowl	0.25 + 0.25 + 2.0	83	10.0	4.1	2.8	923
Prowl + Blazer	1.5 + 0.25	53	10.3	4.3	3.1	1059
Prowl + Cobra	1.5 + 0.25	56	9.7	4.9	3.9	1089
Prowl + Dual Magnum	1.5 + 0.25	63	11.4	4.7	3.7	1198
Prowl + Visor	2.0 + 0.25	90	9.7	4.5	3.0	925
Prowl + Visor	1.5 + 0.38	89	10.0	4.7	3.0	919
Milestone	0.25	97	9.8	3.8	3.0	947
Spartan	0.25	89	10.1	5.6	5.9	1328
Valor	0.07	66	10.4	4.2	2.7	1090
Prowl	2.0	69	8.7	3.1	2.8	791
Handweeded	—	100	11.2	6.3	6.1	1414
Untreated	—	0	6.3	1.8	1.3	537
$LSD_{0.05}$	—	23	2.1	1.1	1.3	282

3. Flaming and organic weed control study. Plots were established at WSU Mount Vernon. Propane flaming was used either once or twice pre-transplant or once pretransplant and once post-transplant, and compared to standard rototilling prior to planting of 'Hood' strawberry. Flaming was done 6/3 and 6/13, rototilling on 6/13, and planting on 6/13. Products tested across these flaming treatments included corn gluten meal at two rates, wheat gluten, two types of mustard seed meal (high and low glucosinolates), Goal, Prowl, and a combination of Goal + Prowl applied post-transplant. All treatments were applied 6/13 except wheat gluten, which was applied 6/19. Crop injury and weed control were evaluated, as was the amount of hand labor required to maintain weed control through the first growing season. The effect of these treatments on leaf area and number of runners and daughter plants was determined, and the effect of these treatments on berry yield and fruit size will be measured in the 2001 harvest.

2000 results:

The effect of organic materials and herbicides on weeds and strawberries are given in Tables 8 and 9. Of these, only Goal and Prowl + Goal significantly reduced grass weed density compared to the untreated check at the 6/27 evaluation; these treatments also significantly reduced broadleaf weed density, as did both mustard treatments, at 6/27. By the September evaluation, however, no treatments were significantly less weedy than the check plots.

Handweeding time was not significantly reduced by any treatment in June. Goal reduced the July weeding time, and all the synthetic herbicide treatments, the high glucosinolate mustardseed meal, and the wheat gluten reduced August weeding times. Prowl was the only product that reduced September or season-long weeding times. Interestingly, the low rate of corn gluten meal actually increased September and season-long weeding times.

Strawberry growth was not much affected by treatment with organic materials or herbicides. The Prowl + Goal treatment reduced number of runners and daughter plants as well as leaf area compared to untreated strawberries; Prowl used alone also reduced number of runners. In addition, the low rate of corn gluten meal significantly increased the number of daughter plants.

The effect of flaming on weeds and strawberries are given in Tables 10 and 11. Control of grassy weeds was poorer resulting from the single PRE flaming than from rototilling on 6/27, but there was no significant difference between treatments by 9/14. Similarly, the single PRE flaming resulted in poorer broadleaf weed control than from rototilling, which in turn was poorer than either of the twice-flamed strawberries.

Two flamings, either pre- or post-transplant, reduced the June handweeding time 34 to 46% compared to one flaming, while rototilling cut handweeding time by 38%. By September, however, weeding time was 9 to 14% lower for the pre-flaming or rototilling, indicating that weed seed germination may have been delayed by the second flaming operation. Overall, no significant difference in total weeding time resulted from flaming. The number of strawberry leaves and runners and leaf area was reduced in rototilled plots compared to all flamed plots, and daughter plant production was reduced compared to the early + pre-transplant flaming.

Table 8. Weed ratings and handweeding times after treatment with organic materials or herbicide (2000).

		Grass weed rating		Broadleaf weed rating		Handweeding time				
Treatment	Rate	6/27	9/14	6/27	9/14	June	July	Aug.	Sept.	Total
	lbs product/a	%		%		hrs/a				
Corn gluten meal	435	2.0	2.3	1.3	3.0	15	11	24	117	167
Corn gluten meal	870	1.7	2.9	1.3	2.8	13	10	18	101	142
wheat gluten	625	1.4	1.8	1.4	2.8	11	11	21	98	140
Mustardseed meal (low gluco.)	575	1.3	1.8	1.0	2.9	7	9	24	101	140
Mustardseed meal (high gluco.)	575	1.3	1.8	1.0	2.9	8	8	19	101	135
Prowl	4.8 pt	1.8	1.8	1.1	1.8	11	9	17	81	118
Goal	1.5 pt	1.0	2.7	1.0	1.9	6	7	15	94	122
Prowl + Goal	2.4 pt + 1 pt	1.2	2.5	1.0	1.8	6	7	14	99	126
Untreated	—	1.6	1.6	1.3	3.0	9	9	26	95	138
$LSD_{0.05}$	—	0.4	ns	0.2	ns	4	2	5	12	17

Table 9. Strawberry growth after treatment with organic materials or herbicide (2000).

Treatment	Rate	Number of Leaves	Number of Runners	Number of Daughters	Leaf area
	lbs product/a	per plant	per plant	per plant	cm^2
Corn gluten meal	435	14.7	5.6	5.0	3358
Corn gluten meal	870	13.5	5.2	4.5	3137
wheat gluten	625	12.4	4.9	3.6	2827
Mustardseed meal (low gluco.)	575	13.8	5.7	3.9	3262
Mustardseed meal (high gluco.)	575	12.9	4.9	3.8	2750
Prowl	4.8 pt	14.0	4.3	2.9	2749
Goal	1.5 pt	13.4	4.9	4.1	2797
Prowl + Goal	2.4 pt + 1 pt	12.7	4.2	2.2	2406
Untreated	—	14.3	5.4	3.8	3257
$LSD_{0.05}$	—	ns	0.8	1.0	489

Table 10. Weed ratings and handweeding times after flame treatment (2000).

	Grass weed rating		Broadleaf weed rating		Handweeding time				
Treatment	6/27	9/14	6/27	9/14	June	July	Aug.	Sept.	Total
	%				hrs/a				
Early flame + pre-flame	1.4	2.5	1.0	2.5	7	8	19	107	142
Early flame + post-flame	1.4	2.3	1.0	2.6	9	10	22	102	142
Pre-flame only	1.8	2.1	1.4	2.6	13	9	19	92	134
Rototill	1.4	1.7	1.2	2.5	8	9	19	93	129
$LSD_{0.05}$	0.3	ns	0.1	ns	3	ns	ns	8	ns

Table 11. Strawberry growth after flame treatment (2000).

	Number of			Leaf
Treatment	Leaves	Runners	Daughters	area
	per plant			cm^2
Early flame + pre-flame	13.8	5.3	4.0	3040
Early flame + post-flame	14.4	5.1	3.9	3112
Pre-flame only	14.0	5.2	3.9	3091
Rototill	11.9	4.5	3.3	2555
$LSD_{0.05}$	1.1	0.5	0.7	326

Red Raspberry Studies

1. Herbicide effects study. Long-term plots were established at WSU Vancouver in spring of 2000 to determine the effects of these herbicide programs on health and longevity of established raspberries. Treatments include a dormant-season application of Casoron (2/23/00) was followed by Goal, Aim, or Enquik applied to 4- to 8-inch primocanes (4/12/00). These treatments will be repeated in each of the following two years, and the effect on fruiting and cane vigor will be evaluated in 2001 and 2002.

2000 results: Herbicides did not cause significant differences in fruit yield or quality in 2000, nor did they change floricane density. Slight changes in primocane size and density were noted, however. These data were collected by WSU Vancouver personnel and were not available for release at press time. Weed control (6/20/00) is listed in Table 1.

Table 1. Weed control from residual (dormant) and caneburning (spring) herbicides (2000).

Residual	Rate	Caneburning	Rate	Weed control
	lbs ai/a	lbs ai/a	%	
Casoron	4	None	0	97
Casoron	4	Aim	0.1	100
Casoron	4	Goal	0.4	99
Casoron	4	Enquik	10 gal	100
None	0	Aim	0.1	70
None	0	Goal	0.4	94
None	0	Enquik	10 gal	90
None	0	None	0	0
None	0	None	0	0
$LSD_{0.05}$	—	—	—	8

2. Quackgrass trial. Plots were established near Burlington, WA (Sakuma Brothers, cooperator). Products tested included Roundup, Touchdown, Fusilade, Poast, Select, Assure II, Kerb, and Casoron (all applied postemergence 4/11/00; quackgrass plants ranged from emerging to 4-leaf). Quackgrass control was evaluated, as was the effect of these treatments on berry yield and fruit size.

2000 results: There was no significant difference in total yield or quality of fruit from treated canes. Quackgrass control is listed in Table 2.

Table 2. Quackgrass control from postemergence herbicide treatments (2000).

Treatment	Rate	General weed control (4/19)	Quackgrass control 5/31	9/12
	lbs ai/a	%	--------- % ----------	
Casoron	4	9	58	24
Fusilade	0.375	25	100	89
Poast	0.5	16	92	45
Select	0.251	18	98	74
Assure II	0.083	20	95	88
Roundup	1.5	58	97	82
Touchdown	1.5	48	99	97
Kerb	3	5	40	29
Simazine	4	3	29	16
Untreated	—	0	0	0
$LSD_{0.05}$	—	11	19	35

3. Yellow nutsedge trial. Plots were established near Burlington, WA (Sakuma Brothers, cooperator). Products tested included preemergence Casoron, Dual Magnum, Frontier, Lasso, Topnotch, Spartan, and Sinbar (4/10/00), and postemergence Basagran and Permit (6/2/00; yellow nutsedge plants 3- to 4-inches). Yellow nutsedge control was evaluated, as was the effect of these treatments on berry yield and fruit size.

2000 results: There was no significant difference in total yield or quality of fruit from treated canes. Yellow nutsedge control is listed in Table 3.

Table 3. Yellow nutsedge control from several herbicide treatments (2000).

Treatment	Rate	General weed control (4/19)	Nutsedge control 5/31	Nutsedge control 9/12
	lbs ai/a	%	-------- % --------	
Casoron	4	10	98	86
Dual Magnum	1.25	83	99	50
Frontier	1.0	13	97	0
Lasso	2.0	10	90	30
Topnotch	2.0	0	50	7
Spartan	0.25	37	80	72
Sinbar	1.6	43	3	50
Basagran	1.0	—	0	27
Permit	0.047	—	0	78
Untreated	—	0	0	0
$LSD_{0.05}$	—	22	18	48

4. Caneburning study. Plots were established near Woodland, WA (Jerry Dobbins, cooperator). Products tested were Goal, Aim, and Apogee (a new plant-growth regulator) at two rates applied to 4- to 8-inch primocanes (4/12/00).

2000 results: Primocane control is listed in Table 4.

Table 4. Primocane control from postemergence treatments (2000).

Treatment	Rate	Primocane control (6/20)
	lbs ai/a	%
Apogee	0.25	0
Apogee	0.5	5
Goal	0.4	85
Aim	0.1	83
Untreated	—	0
$LSD_{0.05}$	—	13