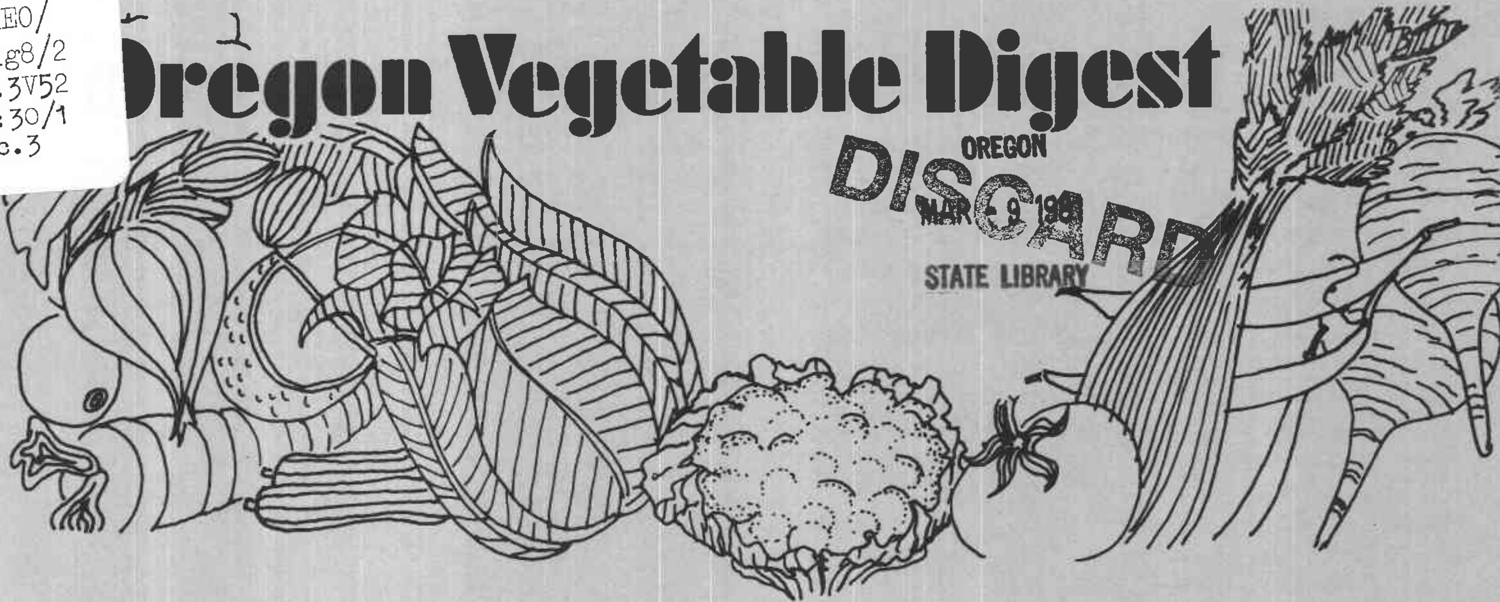
Oregon Vegetable Digest



Volume 30 Oregon State University, January 1981 Number 1

Splitting Nitrogen Application Increases Sweet Corn Yield

Production of commercial nitrogen fertilizers depends on fixing atmospheric N, a process which consumes natural gas. As world energy prices soar, the cost of fertilizer N must also increase, making efficient crop uptake of applied N ever more important.

It may be possible to increase the efficiency of crop N utilization by splitting the total crop requirement among two or more applications. In some situations, application of the entire crop N requirement at one time may lead to significant losses to volatilization, leaching, or runoff. In addition to the economic loss, nitrogen fertilizer contaimination of ground or surface water is considered an environmental pollutant. The following experiment was designed to determine whether splitting N applications would increase the yield of sweet corn relative to applying all N at planting.

The experiment was first carried out during the 1979 growing season and was repeated in 1980. The variety 'Jubilee' was used both years. Planting date was May 14 in 1979 and May 16 in 1980. In both years, the plot area received a broadcast application of 200 lb/A of 0-0-52; atrazine (1.25 lb/A) and alachlor (2.0 lb/A) were used for weed control. Total irrigation plus precipitation during crop growth was 16 inches in 1979 and 15 inches in 1980. Between-row spacing was 30 inches; plant population was about 25,000/A in 1979 and 20,000/A in 1980. Individual plots consisted of 6 rows x 30 ft.

In this issue . . .

All plots received 40 lb/A of N (as 13-39-0), banded two inches to the side and two inches beneath the seed row at planting. The following nitrogen treatments were applied in randomized block design with six replications. (1) All N at planting; in addition to the banded N, 120 lb/A of N (as ammonium nitrate 34-0-0) was broadcast and irrigated in immediately after planting; (2) Two-way split; 40 lb/A of N banded at planting and 120 lb/A of N was sidedressed when corn plants were about one foot tall. (3) Three-way split; 40 lb/A of N banded, 60 lb/A sidedressed at one foot stage, and 60 lb/A sidedressed just before tasseling. (4) Four-way split; 40 lb/A banded, 40 lb/A at one foot stage, 40 lb/A before tasseling, and 40 lb/A at first silk. Thus, each treatment totalled 160 lb/A of N. Plots were once-over harvested on August 20, 1979 and September 10, 1980. Ears were weighed with husks on and graded as follows: #1, completely filled ears with fully mature kernels; #2, incomplete fill or immature, #3, culls.

In both 1979 and 1980, the differences in total ear weight as a result of treatment were small and not statistically significant. But the yield of grade #1 ears did respond to treatment in both years (Table 1). In 1979, the yield of #1 ears increased by 49 percent from 7.6 to 11.3 T/A when application of the bulk of the N was delayed until early July. Further splitting of N application did not increase yield. Similarly, a 57 percent yield increase occurred with the two-way split in 1980 and, again, further splitting did not affect yield. The overall lower yields in 1980 were caused by lower plant population and poorer growing conditions.

These results, obtained on a Willamette sandy shot loam, are in contrast to those earlier at Corvallis by S. B. Apple, Jr., who found no yield differences caused by timing of N application with 'Golden Cross Bantam' grown on Chehalis silty clay loam. Heavier soils with higher clay content may absorb and retain fertilizer and water more effectively than lighter, sandier soils. The form of N applied also may influence the loss to leaching and volatilization. Application of all N in the ammonium form or as urea may slow leaching loss. Soil temperature and method of fertilizer application, e.g., banded beneath the surface, incorporated, or broadcast on the surface, also may affect losses from leaching, runoff, and volatilization.

In situations where significant N loss is likely, the economic gain of splitting the application to insure more efficient N utilization must be weighed against the higher costs for an extra application. Applying the additional N through the irrigation system should result in an increased net return provided the higher cost of liquid N fertilizer solutions does not exceed the expected increase in gross from higher yield.

D. D. Hemphill Jr.
North Willamette Experiment Station

Pepper Varieties Tested

Sweet peppers, especially the larger bell types, are important to fresh market growers and home gardeners in western Oregon. There is also some interest and potential for processing, either as whole, frozen stuffing peppers, or for dicing and use as flavoring in mixed vegetable packs. Peppers are moderately well adapted in the Willamette Valley, even though production may be relatively late because of cold weather in May and June. Some varieties are marginal in cooler seasons.

Of 31 varieties observed in 1980, all were of the green bell type which mature red, except for one golden maturing bell, two immature yellow (wax) varieties, and two of the pimento type. The bell varieties included a range of size and earliness.

Plants were grown in the greenhouse and on May 23 were transplanted 24 inches apart in rows 36 inches apart. The rows had been banded with 600 lbs/acre of 8N:24P_2O_5:8K_2O granular fertilizer. A sidedress of 100 N/acre as ammonium nitrate was applied when the plants were established and blooming. Water was applied every 1 to 2 weeks as necessary to maintain optimum growth. No insect or disease problems were encountered.

Estimates of yield potential were obtained during the first week of October by harvesting fruit from nine plants

Table 1. Effect of Timing of N Application on Sweet Corn Yield

Treatment	Yield of #1 Ears 1979	Yield of #1 Ears 1980	Total Yield (#1 plus #2) 1979	Total Yield (#1 plus #2) 1980
	-------------T/A fresh weight			-----------------
All N at planting	7.6a	5.3a	14.3a	9.6a
Two applications	11.3b	8.3b	15.8a	10.4a
Three applications	10.7b	8.4b	15.2a	10.6a
Four applications	10.9b	7.2b	15.0a	10.4a

Means within a column which are followed by different letters are significantly different at 99% confidence level.

\- - - - - - - - -

Oregon Vegetable Digest is published four times a year by the Agricultural Experiment Station, Oregon State University, Corvallis, OR 97331, J. R. Davis, Director. Address correspondence to the author concerned or to the Department of Horticulture.

of 10 planted for most varieties. In a few cases, fewer plants were available. For 'Pimento L,' 'Parkwonder,' 'Parks Pot,' and 'Early Bountiful,' there were only 3 or 4 plants each.

In Table 1, data are shown for large size fruits considered commercial usable, and medium size fruits, which are probably not usable for market. However, the separation of large and medium depended somewhat upon normal size for the variety, i.e., grading of small, early types such as 'Early Bountiful' and 'Vinedale' was not as strict as with the larger-fruited varieties.

Large-sized fruits were separated into smooth (No. 1) and rough (No. 2) grades. Generally, No. 1 fruit was considered acceptable for stuffing, while the more contorted fruit in No. 2 grade may be of use only for flavoring or dicing purposes.

Outstanding varieties for tons of smooth fruit/acre were 'Lamuyo,' 'Lady Belle,' 'Golden Belle,' 'Yolo Wonder L,' 'Emerald Giant,' 'Yolo Wonder,' 'California Wonder 300', 'Pip', and 'Bellboy.' Of these, 'Yolo Wonder L' and 'Bellboy' had the highest general fruit quality scores, while 'Lamuyo' received a low score because of long, thin-walled, often flattened fruit. The two pimento types, Burpee's 'Early Pimento' and 'Pimento L,' both yielded well, had smooth, uniform fruit, and should be considered as possibilities for western Oregon. However, 'Pimento L' was late, with no development of red color by harvest time.

'Citeino' and 'Gypsy' were uniform, early to produce usable fruit, and had high total yield. Because of the greenish-yellow immature color and low weight/fruit these are likely to be of use only for home gardens.

J. R. Baggett
Horticulture Department

North Willamette Station Vegetable Research Summary--1980

Overwintered Onions (N. S. Mansour, Cooperator)

The performance of seven Japanese cultivars was evaluated. The trials were seeded on August 30, 1979 and harvested on June 10, 1980. In addition to the cultivars, the effect of early vs. late spring application of nitrogen was investigated. The timing of N application had no effect on yield of any cultivar but the late application did slightly delay maturity. Express Yellow, Dragon Eye, and Amber Express were the most successful cultivars in terms of yield and quality. Total yields were in the 260 to 300 cwt/A range.

Overwintered Cauliflower (N. S. Mansour, Cooperator)

Previous trials have identified adapted varieties. The 1979-80 trials were designed to obtain more information on effects of planting date and rate of fertilizer application on yield. The cultivars Armado April and Preminda were used. Seed was sown in a screenhouse on August 1, August 16, and August 30, 1979 and transplanted on August 28, September 10, and October 8. All plots received the same initial fertilizer application. The spring N applications were as follows: 50 lb/A of N on February 12 and March 7, 1980 or 100 lb/A of N sidedressed on the same dates. Armado April slightly outyielded Preminda at all planting dates and N rates. The earliest planting outyielded the second and third plantings. Higher yields were obtained with the higher rate of N. There was no significant winterkill even though temperature fell to below 15^{O}F for four consecutive nights. Planting date had little effect on date of maturity.

Table 1. Estimated Yield of Bell Pepper Varieties, Corvallis, Oregon, 1980.[1]

Variety	Source[2]	Large Size: Gross Lbs/Plant	No 1 Grade (Smooth): No/Plant	No 1 Grade (Smooth): Lbs/Plant	No 1 Grade (Smooth): Av Wt	No 1 Grade (Smooth): No./acre 100	No 1 Grade (Smooth): Tons Acre	No 2 Grade (Rough): No/Plant	No 2 Grade (Rough): Lbs/Plant	No 2 Grade (Rough): Av Wt	No 2 Grade (Rough): No./acre 100	No 2 Grade (Rough): Tons/Acre	Medium Size: No/Plant	Medium Size: Lbs/Plant	Medium Size: No./acre 100	Medium Size: Tons/Acre
Lamuyo	1	6.4	7.7	3.9	.51	559	14.2	5.3	2.5	.47	384	9.1	3.5	.8	254	2.9
Belaire	2	4.6	3.4	1.6	.48	247	5.8	3.0	1.4	.47	218	5.1	6.9	1.5	501	5.4
Cal Wonder 300	3	4.4	5.4	2.5	.47	392	9.1	1.7	.8	.45	123	2.9	5.0	1.1	363	4.0
Pip	3	5.5	5.0	2.6	.51	363	9.4	4.3	1.9	.45	312	6.9	4.6	1.0	334	3.6
Midway	4	5.9	3.4	1.8	.52	247	6.5	7.4	3.4	.45	537	12.3	4.4	.8	319	2.9
Early Calwonder	3	5.5	4.0	2.1	.52	290	7.6	4.6	1.8	.40	334	6.5	7.8	1.6	566	5.8
Big Bertha	6	6.6	1.1	.7	.63	80	2.5	9.9	5.1	.51	719	18.5	4.7	.8	341	2.9
Hybelle	4	5.2	3.0	1.3	.45	218	4.7	7.3	2.7	.37	530	9.8	6.9	1.2	501	4.4
Canape	4	7.5	3.4	1.1	.32	247	4.0	22.1	5.4	.24	1604	19.6	8.1	1.1	588	4.0
Burpee's Fordhook	5	5.3	7.4	2.2	.29	537	8.1	3.1	.8	.24	225	2.9	17.7	2.4	1285	8.7
Burpee's Tasty Hybrid	5	5.9	3.2	1.3	.41	232	4.7	9.9	3.6	.37	719	13.1	6.4	1.0	465	3.6
New Ace Hybrid	5	6.5	7.2	2.4	.33	523	8.7	12.1	3.6	.30	878	13.1	3.6	.5	261	1.8
Lady Belle	4	5.6	7.6	3.5	.46	552	12.7	5.0	1.8	.37	363	6.5	2.0	.3	145	1.1
Golden Bell	6	5.0	6.6	2.9	.44	479	10.5	5.7	1.9	.33	414	6.9	1.4	.3	102	1.1
Burpee's Early Pimiento	5	4.0	15.0	2.6	.17	1089	9.4	9.1	1.2	.13	661	4.7	3.0	.2	218	.7
Bell Boy	6	5.3	5.3	2.6	.49	385	9.4	6.8	2.5	.36	494	9.1	1.8	.2	131	.7
Gypsy	6	4.8	5.4	1.4	.25	392	5.1	14.8	3.3	.22	1074	12.0	1.6	.2	116	.7
Yolo Wonder - A	3	5.1	1.2	.6	.53	87	2.2	9.2	4.1	.45	668	14.9	1.7	.3	123	1.1
Citeino	6	5.6	6.6	2.4	.36	479	8.7	9.8	2.8	.29	711	10.2	3.2	.4	232	1.5
Yolo Wonder - L	3	5.7	6.4	3.2	.50	465	11.6	4.9	2.1	.42	356	7.6	2.1	.4	152	1.5
Blue Star	3	6.4	3.1	1.6	.51	225	5.8	9.2	4.7	.50	668	17.1	.9	.1	65	.4
Sweet Belle	7	5.7	3.4	1.7	.50	247	6.2	7.8	3.6	.47	566	13.1	3.5	.4	254	1.5
Emerald Giant	8	5.2	6.3	2.8	.45	457	10.2	4.4	1.7	.37	319	6.2	5.3	.7	312	2.5
Keystone Res. Giant	8	4.9	4.9	2.1	.44	356	7.6	5.9	2.2	.38	428	8.0	3.3	.5	240	1.8
Yolo Wonder	3	5.0	6.6	3.2	.49	479	11.6	7.1	2.9	.40	515	10.5	1.6	.3	116	1.1
Early Bountiful	9	3.4	3.0	.9	.31	218	3.3	9.5	2.1	.22	690	7.6	4.0	.5	290	1.8
Vinedale	10	3.7	3.3	.6	.18	240	2.2	16.5	2.5	.16	1198	9.1	4.8	.3	348	1.1
Pimento L	6	4.5	7.7	2.7	.36	559	9.8	5.0	1.6	.31	363	5.8	1.0	.2	73	.7
Parkwonder	11	3.1	0.0	0.0	0.00	0	0	12.7	2.9	.23	922	10.5	1.3	.2	94	.7
Parks Pot	11	4.2	5.3	1.1	.20	385	4.0	19.3	3.0	.16	1401	10.9	1.0	.1	73	.4
Mercury	11	3.8	4.1	2.0	.48	298	7.3	3.9	1.5	.38	283	5.4	1.9	.4	138	1.5

[1] Data obtained from 9 plants from 2 adjacent 5-plant plots, rows 3 ft. apart, plants 2 ft. apart in row.

[2] Sources: (1) Sluis & Groot (2) FMC Seeds (3) Asgrow (4) Harris Seeds (5) Burpee (6) Peto (7) Ferry Morse (8) Northrup King (9) Sabota (10) Stokes (11) Park

Table 2. Bell Pepper Variety Observations, Corvallis, Oregon, 1980.

Variety	Wall Thickness mm	Wall Thickness score	Green Color Score	Bronzing	% of Red Ripe	Overall Fruit Score	Plant Ht	Plant Breakage	General Notes
Lamuyo	3-5	2	2	None	8.9	2	18"	1	Long, rather rough, large
Belaire	5-6	3	3	None	5.2	3		Some	Some short, fat, rough fruit; some indented tops, some multi-lobing
Cal Wonder 300	5-7	3	3	None	0.0	4		Slight	Some bullnose; generally smooth, good shape
Pip	6-8	4	4	None	1.5	3		None	Many rough, short, fat, but rest uniform, good shape, med. size, smooth
Midway	5-7	3	3	None	15.3	1		None	Very rough, misshaped, bullnosed, large
Early Calwonder	5-7	3	3	Some	7.0	3		None	Small, uniform, generally smooth
Big Bertha	4-5	3	2	Slight	5.1	1	24"	Some	Tall, rangy plant, fruit low, stands up well; fruit large, long, quite rough
Hybelle	5	3	4	Slight	26.9	3	18"	Plts. down but not broken;heavy crop	Med. size, quite a few rough fruit, bullnosed
Canape	3-5	2	4	None	27.9	2	18"	None	Plant sl rangy, fruit well covered fruit small, mostly rough, many indented tops
Burpee's Fordhook	5-6	3	3	Bad	5.2	3	16"	Plts. flattening w/heavy load	Round, small fruit but generally uniform good shape, smooth
Burpee's Tasty Hybrid	4-7	3	3	Mod	21.2	2	16"	Heavy load, mod breakage	Lg. fruit, quite rough with bullnosed and indented tops
New Ace Hybrid	3-5	2	3	None	23.0	2	16"	None	Lg. fruit, generally rough, bullnosed,sl. sunburn
Lady Belle	5-7	3	4	None	20.4	3	14"	Slight	Sl. sunburn, lg. fruit, many indented tops, bullnosed, gen. good shape, generally smooth
Goldenbell	4-6	3	4	None	—	3	18"	None	Mod. sunburn, lg. fruit, most have indented tops bullnosed, gen. smooth
Burpee's Early Pimiento	4-6[1]	4	4	None	12.4	4	24"	Some	Smaller fruit, top shaped, large size similar to medium in other peppers
Bell Boy	5-6	3	3	Slight	18.3	4	18"	None	Mod. sunburn, lg. fruit, some bullnosed, smooth, good shape
Gypsy	3-5	2	3	None	19.8	3	24" Rangy	None	Not bell type-long, pointed shape & smaller. Color yellow-green to orange to red
Yolo Wonder - A	5-7	3	3	None	7.4	2	18" Compact	None	Most wider than long, irreg. shapes, sl. bullnose
Citeino	4-6	3	3	None	13.4	3	18" Plt. down		Not bell type, long pointed shape, smaller, color yellow to deep orange
Yolo Wonder - L	4-6	3	3	None	7.8	4	24"	None	Lg. fruit, smooth, good shape, some bullnosed; pt. looser, larger than Yolo Wonder - A
Blue Star	3-5	2	3	None	14.4	2	20"	None	Long, tapered, sl. lt. wt., lg., some caved-in sides, quite rough
Sweet Belle	6-8	4	2	None	10.1	3	24"	Slight-1 or 2 light on fruit	Some rough, irreg. color, some bullnose
Emerald Giant	4-6	3	3	None	2.1	2	16-18"	None	Rough, squatty, multi-lobed; some bullnosed
Keystone Res. Giant	4-6	3	3	None	0.0	3	20-24"	Some	Many rough, some bullnosed
Yolo Wonder	5-8	4	3	None	3.1	3	16"	Slight	Compact plt.,some bullnosed,gen. smooth,some multi-lobed
Early Bountiful	3-5	2	4	None	54.0	2	12"	None	Some v. early & red, rough, med. fruit, misshapen
Vinedale	3-5	3	3	None	41.2	2	14"	None	Sm. fruit, not bell type, many red, pointed, rough
Pimento L	6-9[1]	4	2	None	0.0	3	16"	None	Late, not bell type,med.size,round&pointed,smooth
Parkwonder	3-5	2	3	None	53.7	2	14"	Some	Many red ones, v. rough & irreg., medium size
Parks Pot	3-4	2	3	None	34.7	2	14-16"	None	Heavy load, med. early, v. rough, med. size
Mercury	4-7	3	2	None	9.4	3	20"	Slight	Sm., lg. & blocky,color sl. olive, some multi-lobed

[1] Thick wall relative to fruit size

Sweet Corn Yield Affected by Timing of N Application

The purpose of this trial was to confirm results obtained in 1979. All plots received a total of 160 lb/A of N. The four treatments were as follows: a) all N applied at planting, 40 lb banded beneath the seed row and 120 lb broadcast; b) 40 lb banded at planting and 120 lb applied seven weeks after planting; c) 40 lb banded at planting, 60 lb seven weeks after planting, and 60 lb at first tasseling; d) 40 lb at planting, 40 at seven weeks, 40 at first tasseling, and 40 lb after silk appearance. As in 1979, split applications produced higher yields than applying all N at planting. For example, the yield of fully mature ears of Jubilee was increased from 5.3 T/A with one application, to 8.3 T/A with two applications, and 8.4 T/A with three applications.

Effect of Copper, Boron, Banded and Broadcast Phosphorus, and Lime on Sweet Corn Yield (T. L. Jackson, Cooperator)

Willamette Valley corn fields have been found to test low for copper and boron in soil and leaf tissue analyses. Corn yields are known to respond to band applications of phosphorus, but proper rates at high soil phosphorus levels are unknown. In this trial, the effects of Cu, B, banded P, broadcast P, and lime on corn yields were studied at both an early and a late planting date. Both broadcast and banded P produced large yield increases, particularly at the early planting date. Banded P response was lower in the presence of a high rate of broadcast P. There was no response to B application. Yields did respond to liming and Cu application increased yield at low soil pH.

Brussels Sprouts Variety Trials (N. S. Mansour, Cooperator)

Early, mid, and late-spring plantings were involved with a dozen cultivars investigated at each planting date. By mid-November, only the early and middle plantings had been harvested. The early trial was transplanted on April 25 and harvested on August 12 (two cultivars) and September 23 (10 cultivars). Most promising cultivars in terms of yield and quality were Jade Cross E, Lindo, and Argosy. The middle trial was transplanted on May 6 and harvested on November 10. Most promising cultivars were Achilles, Horatius, and Jade Cross F.

Solar Trenches for Vegetable Production (N. S. Mansour and Jack Parsons, Cooperators)

The "solar trench" is a V-shaped furrow 12 inches deep and 18 inches wide at the top. Bottom and sides are lined with black plastic mulch for weed control and after planting, the top is covered with perforated clear plastic mulch. This arrangement provides some frost protection and increased air and soil temperature. Trenches were seeded and transplanted with peppers, squash, tomatoes, and melons on April 22. All crops but peppers grew well in the trenches and matured fruit earlier than plants grown on beds. Problems noted were poor pollination under the clear plastic and lack of growing room.

Effect of Gibberellin Plant Hormone on Field Production of Rhubarb (Jack Parsons, Cooperator)

Gibberellin sprays have been used to stimulate growth of hothouse-forced rhubarb but have not been successful in the field, perhaps because of poor uptake or light-induced breakdown of the gibberellin. In this trial, the hormone was injected directly into the crowns both with and without DMSO as a carrier. The treatments had no statistically significant effect on spear weight or number of spears produced, but a trend existed for 1,000 ppm gibberellin to produce higher yields. This experiment will be repeated at higher rates of hormone.

Effect of Soil Moisture on Survival of Rhubarb Crown Divisions (Jack Parsons, Cooperator)

Crown divisions were planted in five-gallon cans filled with a sterile soil-peat potting mixture. Different rates of water were applied, ranging from conditions producing dessicated spears to conditions in which the soil was constantly saturated. Spear yield was greater at the higher rates of water application, but there was no effect on crown survival or degree of rotting.

Watermelon Variety Trial

The trial included 26 early maturing cultivars or lines from eight seed companies. Highest yielder was New Shipper, followed by Klondike Striped Blue Ribbon, Seedless Hybrid 313, and Yellow Doll. Largest fruit were produced by New Shipper, Klondike Striped Blue Ribbon, Prince Charles, and All Sweet. Highest quality melons were Prince Charles, Seedless 313, Yellow Baby, Klondike Striped Blue Ribbon, and Crimson Sweet. Although the summer was unusually cool, many cultivars produced yields in excess of 20 T/A and most fruit was ripened before first frost.

Utilization of Tannery Waste on Cropland (Van Volk, Cooperator)

Chrome tannery waste consisting of a mixture of hide, hair, fat, and processing chemicals has been used as a fertilizer for vegetable crops and pasture grass for the last three years. The fertilizer value of fresh waste applications to plots seeded to beans and sweet corn was low but crop quality was not adversely affected. Tannery waste has proven to be a very effective fertilizer for pasture grass. Residual N available from previous waste applications was an effective N source for lettuce and broccoli. Effect on crop heavy metal content has not yet been determined.

Effect of Several Anticrustants on Stand and Yield of Small-Seeded Vegetable Crops

The five crops--carrots, lettuce, onions, cucumbers, and cauliflower--were used to determine the effect on stand and yield of the possible anticrustants/emergence stimulators phosphoric acid, Nalco 2190, vermiculite, banded superphosphate, and neutral ammonium phosphate solution (10-34-0). Plots were seeded on April 30 and again on July 1 and treatments applied at planting. Stand counts were made at several intervals after seeding, soil crusting was measured, and yields were obtained for all crops by cauliflower. Vermiculite over the seed row was by far the most effective treatment for reducing soil crusting. Phosphoric acid was also effective, Nalco 2190 less so. The 10-34 solution slightly reduced crusting but banded superphosphate had no effect. Vermiculite was also the most effective emergence stimulator for all crops, followed by phosphoric acid. There was a trend for Nalco 2190 and 10-34-0 to also increase stands, but banded superphosphate tended to reduce stands. Effect of treatment on yield varied with the crop. Lettuce yields were highest with vermiculite and second highest with 10-34-0. Cucumber yields were highest with vermiculite and banded superphosphate also increased yield. Carrot yields were highest with vermiculite, second highest with phosphoric acid. Onion yields responded equally to vermiculite and phosphoric acid with other treatments having no effect on yield.

Effect of Soil pH on Response of Vegetable Stands to Phosphoric Acid

For both carrot and lettuce, stands increased with increasing soil pH in the range 4.9 to 6.1. Above 6.1, stands tended to decline. Phosphoric acid sprays tended to increase stands and the effect was the same regardless of soil pH.

Effect of Soil pH and Form of N Fertilizer on Stand of Carrots and Lettuce

Carrots and lettuce were seeded on long-term lime plots with pH ranging from 4.9 to 6.5. Several fertilizer sources were applied at a rate of 200 lb/A of N. The fertilizer treatments were zero N check, calcium nitrate, ammonium nitrate, ammonium sulfate, urea, calcium nitrate plus ammonium nitrate (100 lb/A of N from each), potassium nitrate, and potassium chloride (600 lb/A). Stands of both carrots and lettuce were depressed initially by all fertilizers except urea. Ammonium sulfate (highly acidic) and potassium chloride (high salt damage potential) caused the greatest inhibition of stands. Soil pH again affected stands; highest stands were achieved at pH 6.1-6.2, lowest stands at pH 4.9-5.3. In contrast to results in 1979, raising soil pH did not lessen the stand inhibitory effects of ammonium sulfate.

Effect of Soil pH and Form of N Fertilizer on Stand and Yield of Spinach

The spinach cultivars Melody and Hybrid 424 were seeded on long-term lime plots with pH ranging from 4.9 to 6.5. Several different N sources had been applied earlier at a rate of 200 lb/acre of N (see previous experiment). The various N sources had no effect on either stand or yield of spinach but soil pH did affect both stand and yield. Stands increased by 23 percent (Hybrid 424) or 41 percent (Melody) between pH 4.9 and 6.1. Higher pH did not further increase stand. There was effectively zero yield below pH 5.5 as the seedlings were extremely stunted. Greatest yield of both varieties occurred at pH 6.4-6.5.

Experiments Still in Progress

Overwinter variety trials of cauliflower, brussels sprouts, cabbage, onions, and spinach are underway. Effect of planting date on yield of overwinter cauliflower continues to be investigated. The final spring 1980 brussels sprouts trial has not yet been harvested.

D. D. Hemphill Jr.
North Willamette Experiment Station

News and Notes

Germination of Lettuce Seeds at High Temperature after Seed Priming

The effects of water or 1 percent K_3PO_4 priming at 5°, 15°, and 25°C for short durations on 'Minetto' lettuce (*Lactuca sativa* L.) seed germination at high temperatures were studied. Germination percentage and rate at 35° of seeds primed in K_3PO_4 were significantly higher than that of seeds soaked in water. Aeration improved the results of priming at 15° and 25°. A priming temperature of 15° was generally best. The effects of light during priming of 'Mesa 659,' 'Minetto' and 'Ithaca' seeds in water, K_3PO_4, polyethylene glycol (PEG) or PEC+ K_3PO_4 solutions at 15° for 6 or 9 hours and drying methods for primed seeds also were studied. Inhibition rates were higher with K_3PO_4. Primed seeds germinated more rapidly at 35° with K_3PO_4 alone or in combination with PEG. Air drying of primed seeds was better than oven drying. Seed priming in light increased germination percentage and rate of 'Minetto' and 'Ithaca,' although neither cultivar is photosensitive. (Guedes, A.C. and D. J. Cantliffe, J. Amer. Soc. Hort. Sci. 105(6):777-781. 1980.) Note: Planters are now available to plant primed seed without the necessity of drying seed before planting. High temperature dormant seed of lettuce is not generally a problem in Oregon.

Electrostatic Application of Low-Volume Microbial Insecticide Spray on Broccoli Plants

Use of electrostatic spray deposition for the control of insect infestation in broccoli (*Brassica oleracea* L., Italica group) resulted in equal or greater control in comparison to conventional methods, and utilized 1/2 to 1/3 the quantity of insecticide with an 8-fold reduction in application volume. Laboratory tests documented a 1.86-fold improvement in the quantity of spray tracer deposited electrostatically onto broccoli plants as compared with conventional application. (Law, S. Edward and Harry A. Mills, J. Amer. Soc. Hort. Sci. 105(6):774-777, 1980.) Note: Electrostatic sprayers imparted an electrical charge to the spray droplets by passing them through an electrical field that usually imposes a positive charge (negative charge works also) to the droplets. This charge is most effective on small droplets (smaller than 50 micrometers), causing them to be attracted to and stick onto plant leaves, thus minimizing drift. In comparison, an 8004 nozzle operating at 30 psi dispenses droplets of a wide range of sizes, most 500 micrometers in diameter, resulting in minimal drift losses. Chemical rate reductions are potentially more appropriate with fungicides and insecticides and least appropriate with herbicides. Commercial electrostatic sprayers are now in development. The greatest benefit from their use probably would be associated with reduction in small droplet drift in special applications.

Storage Behavior of Lettuce Seed

Coated and raw (uncoated) lettuce seed obtained from commercial sources were subjected to six storage conditions (ranging from 21°C, 90% relative humidity (RH) to 5°, 40% RH) for a period of three years. Four types of packaging material differing in moisture-barrier properties were used. Samples were removed periodically for moisture and germination tests. Under poor storage conditions, coated seed deteriorated more rapidly than raw seed controls. Under favorable storage conditions, both coated and raw seed retained full viability for the three years. (Roos, E. E., J. Amer. Soc. Hort. Sci. 104(2):283-288, 1979.)

Pollination Problems of Carrot Inbreds

The inability to achieve adequate pollination of seed parents has slowed the development of hybrid carrots and dampened industry acceptance. Thus, cytoplasmically male-sterile inbreds and F_1 seed parents were compared with their fertile counterparts for synchrony of floral events and character of pollinator foraging stimuli. Usually, but not always, male-sterile plants were visually different, bloomed later, and exhibited delayed nectar and aroma production compared to male-fertiles. The quality and quantity of nectar and aroma were also different, with male-sterile flowers inferior to fertile flowers in amounts of nectar produced. (Erickson, E. H. and C. E. Peterson, J. Amer. Soc. Hort. Sci. 104(5):639-643, 1979.)

Honey Bee Foraging-Carrot Breeding

A study of foraging by honey bees among cytoplasmically male-sterile and male-fertile seed parents of carrot revealed that honey bee discrimination between the fidelity to carrot phenotype and genotype were evident and often extreme. Some lines were extensively visited while others were virtually ignored. Wide differences in seed set were evident among male-sterile F_1's and inbreds and male-fertile lines. Differences in seed yield were correlated with foraging preferences, but the quality of nectar from the stomachs of bees was not. (Erikson, E. H., C. E. Peterson, and P. Werner, J. Amer. Soc. Hort. Sci. 104 (5):635-638, 1979.)

High Relative Humidity Promotes Tipburn on Young Cabbage Plants

Cabbage tipburn is a Ca-related disorder which usually occurs only on margins of leaves enclosed within cabbage heads. Transplants were used to see if continuous high relative humidity (RH) would also induce tipburn on young cabbage plants in order to provide an effective procedure for studying tipburn. Transplants grown in growth chambers under continuous illumination and temperature of 20°C developed tipburn-like symptoms on young leaves within 8 to 14 days when maintained at 82% but not at 52% RH. Plants had larger leaves and greater fresh and dry weights at 82% than at 52% RH. It might be questioned whether the injuries observed on these young cabbage plants duplicate the tipburn injury of heading cabbage plants. However, in field plantings, this sensitive breeding line was observed to develop similar symptoms of injury on young leaves just before heading began and then continued to develop typical injury on all developing leaves throughout head formation. This consistent and rapid development of tipburn in young plants should facilitate research efforts on this disorder. (Palzkill, D. A., T. W. Tibbitts, and B. E. Struckmeyer, HortScience 15(5): 659-660, 1980.)

N. S. Mansour
Extension Vegetable Crops Specialist
Horticulture Department

AGRICULTURAL
EXPERIMENT STATION
of
Oregon State University
Corvallis, Oregon 97331

Director