# OREGON VEGETABLE Digest







Volume XIX Oregon State University, July 1970 Number 3


# New Pole Bean Lines Tested

## No Vegetable Crops Field Day This Year

There will not be a general field day on the Vegetable Research Farm this year. However, those who wish to observe any particular research are welcome to visit the farm at any time.

If you are interested in a specific research area, it is usually best to call in advance. The persons primarily concerned with various crops and problems are listed below.

W. A. Frazier—snap bean and carrot breeding (phone 754-2456)

J. R. Baggett—pea, broccoli, and cabbage breeding (754-2456)

H. J. Mack—physiology and culture of various vegetables (754-2456)

G. Crabtree—vegetable weed control (754-2755)

H. H. Crowell and R. E. Berry—vegetable insect control (754-1833)

E. K. Vaughan—vegetable disease control (754-1044)

Peas and beans are usually best to observe in late July to mid-August, while corn, cole crops, and carrots may be viewed in September and October.

## In This Issue . . .



Several years ago it became clear that hybridization of pole x pole beans would not provide the recombination of characters needed to substantially improve pole varieties for yield and disease resistance. Crosses were therefore made involving a wide range of both pole and bush beans, as well as the Scarlet Runner species. Some of the pole lines reported on in this article are derived from a complex of crosses involving several Oregon bush lines derived from Blue Lake FM-1 pole, Florigreen (rust-resistant pole bean from Florida), California Small White dry bean, Great Northern dry bean, Oregon pole bean selections, and N-203 (a black-seeded runner bean).

Many of these parental materials are of very poor pod quality, but they have resistance or tolerance to one or more diseases, such as root rot, rust, yellow mosaic, and halo blight. Since most of the progeny are also of poor quality, additional crosses and intercrosses of selections have been made to speed up desirable recombinations.

We are now in the early testing stages of these new pole bean lines. In 1968, 104 new selections were made and observed along with 21 advanced lines which were placed in replicated yield plots. Yield and sieve size data for the 21 advanced lines and two different FM-1 seedlots are shown in Table 1. A yield difference of 1.2 tons between any two varieties is required at odds of 20 to 1. There was no significant difference in yield between the two lots of FM-1. If 12.3 tons is used as an FM-1 "check" comparison, then 13.5 tons is required as a significantly higher yielding line. Six of the new lines yielded 13.5 tons or more. Brief notes on these lines follow:

**1083-28.** Originally selected for rapid early season growth, slim pod, and possibly some tolerance to root rot. Sieve size data confirm the small sieve size. Al-


(*Continued next page*)

# Pole Beans Tested . . .

**Table 1. Pole bean yield and sieve size data (Corvallis, 1969)**

| Variety or OSU breeding line | Yield[1] | Percent of yield in sieve sizes | | | |
|---|---|---|---|---|---|
| | | 1-4 | 5 | 6 | 7 & 7+ |
| | *T/A* | | | | |
| 1083-18 | 11.2 | 39.2 | 23.9 | 26.0 | 10.9 |
| 1083-19 | 12.4 | 40.3 | 23.5 | 24.3 | 11.9 |
| 1083-20 | 9.8 | 61.3 | 21.7 | 12.8 | 4.2 |
| 1083-26 | 12.0 | 66.1 | 20.4 | 9.6 | 3.9 |
| 1083-28 | 13.8 | 66.5 | 21.6 | 9.3 | 2.6 |
| 4258-1 | 12.3 | 57.7 | 22.6 | 14.4 | 5.3 |
| FMI-K Calif. | 11.7 | 58.9 | 23.7 | 12.8 | 4.6 |
| FMI-K Ore. | 12.3 | 61.8 | 24.1 | 10.9 | 3.2 |
| 1128-3-5 | 11.2 | 41.6 | 27.0 | 22.5 | 8.9 |
| 1626-13 | 12.8 | 60.9 | 25.1 | 11.5 | 2.5 |
| 1626-14 | 12.9 | 56.2 | 21.8 | 16.6 | 5.4 |
| 1626-16 | 11.2 | 60.4 | 24.0 | 13.0 | 2.6 |
| 439-6-4 | 12.9 | 46.5 | 27.0 | 18.5 | 8.0 |
| 439-6-5 | 14.7 | 51.4 | 26.5 | 16.4 | 5.7 |
| 1083-13 | 11.2 | 72.1 | 16.8 | 8.6 | 2.5 |
| 9710 | 13.6 | 50.0 | 24.7 | 17.5 | 7.8 |
| 434-9-2 | 11.8 | 48.5 | 29.4 | 16.4 | 5.7 |
| 1083-27 | 12.6 | 55.3 | 23.7 | 16.0 | 5.0 |
| 1640-5-4 | 14.7 | 59.6 | 21.1 | 13.5 | 5.8 |
| 439-6-1 | 14.1 | 48.8 | 26.4 | 15.0 | 9.8 |
| 1626-4 | 12.5 | 55.1 | 26.0 | 13.6 | 5.3 |
| 9708-5-8 | 11.2 | 49.8 | 27.4 | 17.4 | 5.4 |
| 303-5 | 13.5 | 58.4 | 24.9 | 13.0 | 3.7 |

[1] Least significant difference in yield, $p < .05$, 1.2 tons.

though raw pod notes indicated some irregularity of pod, the quality of canned product was rated as satisfactory. The line will be continued in yield tests and will be used for hybridization.

**439-6-1 and 439-6-5.** These sister lines were selected originally for possible value if a pole bean harvester were developed. Pods tend to set high on prominent racemes, with good "concentration" of set. Processing quality is questionable because of slightly high fiber, and further hybridization may be necessary.

**9710.** The 9710 line was selected as an FM-1 type, but the quality rating has been slightly low.

**1640.** The line was selected for resistance to bean yellow mosaic virus. Although yield appears good, quality of the canned product (color, texture, flavor) is questionable. This pole line is a sister line of Oregon 190 bush bean, also resistant to bean yellow mosaic virus and possessing relatively good pod quality.

**303-5.** This line also has good resistance to bean yellow mosaic virus, but is somewhat late in maturity and has a basal leafiness which tends to promote damage by white mold.

These notes indicate a few of the many characteristics which must be kept in mind constantly in development of new pole beans. High pod quality, of critical importance, is especially difficult to maintain. To reach for the ideal requires continued hybridization and recombination of these various lines, along with others.

Among the large number of individual pole bean plants selected from segregating progeny in 1968 and planted in small plots in 1969, the following merit closer observation in 1970:

**190 x 1128-1A.** Yield appeared good and pods attractive. Tolerant to yellow mosaic virus.

**190 x 1128-55.** Somewhat similar to 190 x 1128-1A, but pods lighter color.

**190 x 1128-54.** Good vigor, pods apparently very tender; may be slightly long.

**190 x 1128-36.** Selected for apparent high yield and heavy pod set. Pods may be slightly long.

**1083 x 190-5.** Above average plant vigor. Pods slim, straight, but possibly too long.

We have tended to select for slightly longer pods than those of the FM-1 pole bean, since this is one of the many factors which may contribute to yield in snap beans. Yet it is recognized that distinctly long pods would be of questionable value because of potential problems in the processing plant.

In 1970 we have planted the new lines for further observation and yield tests, along with massed segregating of progeny for selection of new, individual plants. We suggest late July or very early August as a time to visit us and view the pole bean plots.

—W. A. Frazier and J. R. Baggett
*Department of Horticulture*

George Varseveld
*Department of Food Science and Technology*

***Oregon Vegetable Digest*** **is published four times a year by the Agricultural Experiment Station, Oregon State University, Corvallis, G. Burton Wood, Director. Address correspondence to the author concerned or to the Department of Horticulture.**

# Fertilizers Affect Yield and Boron Deficiency of Table Beets

Yield of table beets was significantly increased (about 21%) by application of 200 pounds N/A as compared to a 50-pound rate of N. A rate of 200 pounds $K_2O$/A produced yields slightly higher but not significantly higher than a 50-pound $K_2O$ rate. There were no differences in yield when 0 and 10-pound B/A rates were compared. Percent of roots (2 to 3 inch size) showing symptoms of B deficiency, canker, or black heart, was significantly less at the 200-pound N/A rate as compared to 50 pounds N/A and at the 10-pound B/A rate as compared to no added B.

The experiment was conducted at the OSU Vegetable Research Farm during 1969 and included a complete factorial design of fertilizer treatments consisting of 50 and 200 pounds N/A, 50 and 200 pounds $K_2O$/A, and 0 to 10 pounds B/A. Fertilizer was broadcast and disked in before planting Detroit Dark Red (Morse strain) table beets. Soil and leaf samples were taken about two weeks before harvest. Leaf analyses have not been completed. Soil test values, 0 to 6 inch depth, for plots receiving 50 and 200 pounds $K_2O$/A were 144 and 188 ppm K, respectively. The average B soil test value for plots without added B was 0.5 ppm B, while the value was 2.9 ppm B for plots in which a rate of 10 pounds B/A was applied.

**Table 1. Effects of fertilizers (N, K, B) on yields of table beets (Corvallis, 1969)**

| | Yield (Tons/acre) | | | | |
|---|---|---|---|---|---|
| | 50 lbs. $K_2O$/A | | 200 lbs. $K_2O$/A | | |
| | No B | 10 lbs. B/A | No B | 10 lbs. B/A | Nitrogen average |
| 50 lbs. N/A.... | 22.8 | 22.2 | 21.9 | 23.6 | 22.7 |
| 200 lbs. N/A.... | 26.8 | 26.8 | 28.8 | 27.3 | 27.4 |
| B avg. ............. | 24.8 | 24.5 | 25.4 | 25.5 | |
| K avg. ............. | 24.6 | | 25.4 | | |

In Table 1 yield data show that N fertilizer at 200 pounds per acre significantly increased yield over the 50-pound rate of N. Size distribution of beets was influenced by N rates. Percentages of roots that were 1 to 2, 2 to 3, and 3 to 4 inches in diameter were 19, 55, 22, respectively, for the 50-pound N rate and 12, 46, 35 for the 200-pound rate. No significant differences in yield were obtained from $K_2O$ or B rates.

There was a significantly lower percentage of 2- to 3-inch roots that were deficient in B at the 200-pound N rate, 9.5%, than at the 50-pound N rate, 1.5% (Table 2). Twenty-three percent of the 3- to 4-inch size roots had B deficiency at the 50-pound N rate, while 4.6% were B deficient at the 200-pound N rate. A N x B interaction was evident in that at the 50-pound N rate, addition of B significantly reduced B deficiency of roots, but there was no reduction in B deficiency from addition of B at the 200-pound N rate. It should be noted, however, that only a small percentage of roots were B deficient at the 200-pound N rate. Addition of 10 pounds B/A significantly reduced the percent of roots showing B deficiency. Addition of 200 pounds $K_2O$/A increased the incidence of B deficiency at the 50-pound N rate, but had no significant effect at the 200-pound N rate.

**Table 2. Effects of fertilizers (N, K, B) on percentage of 2 to 3-inch roots with boron deficiency (Corvallis, 1969)**

| | Percent of 2-3 inch roots with B deficiency | | | | |
|---|---|---|---|---|---|
| | 50 lbs. $K_2O$/A | | 200 lbs. $K_2O$/A | | |
| | No B | 10 lbs. B/A | No B | 10 lbs. B/A | Nitrogen average |
| 50 lbs. N/A.... | 10.5 | 1.4 | 18.9 | 7.1 | 9.5 |
| 200 lbs. N/A.... | 2.3 | 0.6 | 1.3 | 1.9 | 1.5 |
| B avg. ............. | 6.4 | 1.0 | 10.1 | 4.5 | |
| K avg. ............. | 3.7 | | 7.3 | | |
| | No B - 8.2 | | 10 lbs. B/A - 2.8 | | |

These results agree with our earlier work in which addition of B and N reduced B deficiency of table beets. Potassium, calcium, and perhaps other elements as well as irrigation levels and varieties are related to B nutrition and the occurrence of B deficiency. In many cases foliar applications of B, alone or in combination with soil applications, have been much more effective than soil application alone in eliminating the occurrence of B deficiency in table beets.

—H. J. Mack
*Department of Horticulture*

# Oregon 190 Bush Bean Released for Observation

Oregon 190 bush green pod bean has been released conditionally this summer for observation by seedsmen. A preliminary seed increase is also under way, for use in pilot plantings by processors in 1971 and for possible additional increase. Two small pilot plots have been planted by processors for harvest this summer. No formal release has been authorized.

**Background**. Parentage of Oregon 190 is unusually complex. Involved have been the Blue Lake pole bean, several bush beans derived from backcrossing to Blue Lake, Great Northern, California Small White, Florigreen pole (from Florida), and N-203 (originally introduced into the United States for tolerance to root rot). The various parents were used to introduce resistance to several major bean diseases into a single variety. This objective has been only partially reached. The original selection of 190 was made in the greenhouse in May 1965; it appeared to have tolerance to bean yellow mosaic virus. Various sub-lines of Oregon 190 were selected and tested in the field from 1966 to 1969. Seven sub-lines and one mass line are under observation in 1970 at the vegetable crops research farm. Several seedsmen also are observing the sub-lines.

**Quality.** The Oregon 190 pod, when processed, can be considered as a close approximation to the pole Blue Lake pod. Taste, color, and texture, have been given satisfactory scores in panel tests by most individuals. Under good culture the pods fill relatively well, and are straight, smooth, and dark green in color.

**Sieve sizes.** The line is inherently distinctly smaller sieved than Oregon 58. Seeds are also much smaller than those of 58.

**Pod set and maturity.** Oregon 190 is relatively early, maturing about two days later than Oregon 58 in 1969; in 1970 it has been as early as 58 at the vegetable research farm.

**Growth habit.** The line is considered intermediate in growth habit between Oregon 58 and the older Oregon line 949 (one of the parents). It is not an ideal growth-habit bean, but mechanical harvest appears satisfactory. It can be expected to show more racemes (clusters) among harvested pods than some of the more ideal bush types.

**Yield**. Oregon 190 produces many blossoms and tends to set well in western Oregon. It is rather "concentrated," maturing many pods over a short period of time. Yield of small sieve beans has been especially promising. True yield potential can be determined only after more pilot trials in commercial acreages.

**Disease resistance**. The line has excellent resistance in the field (in our gladiolus area) to yellow mosaic virus (bean virus 2). It has tolerance ("Blue Lake type") to halo blight. It is susceptible to rust, root rot, and white mold.

**Potential**. Oregon 190 is of interest as a good yielding, small sieve bean, near Blue Lake pole in pod quality, tolerant to the halo blight bacterium and yellow mosaic virus. It has only moderate vigor and this factor, along with a usually heavy pod set, necessitates good culture if a full potential for yield and pod shape is to be realized.

—W. A. Frazier, J. R. Baggett, H. J. Mack
*Department of Horticulture*

George Varseveld
*Department of Food Science and Technology*

E. K. Vaughan
*Department of Botany and Plant Pathology*

▲ ▲ ▲

## *Vegetable Notes . . .*

"Pest management" practices to reduce insect losses to sweet corn have been described recently in Bulletin No. 434 (May 1970) of the Agricultural Experiment Station, Raleigh, North Carolina. Of the insect pests discussed, only the corn earworm is a problem in Oregon. The author points out that the silk of many corn varieties is nutritionally deficient, resulting in high mortality or a weakened strain of earworms. Tight husked varieties reduce ear damage by confining the worms longer on a silk diet. Choice of earworm-resistant varieties of sweet corn can allow corn production without the use of insecticides, or, at least, increase the degree of control with the use of less insecticide.

Foliar sprays of $Ca(NO_3)_2$ or $CaCl_2$ completely controlled lettuce tipburn in the variety 'Meikoningen' when directed to susceptible immature leaves. However, Thibodeau and Minotti suggested that practical control of tipburn for field-grown head lettuce by calcium sprays seems remote due to the relative immobility of Ca and the inaccessibility of the susceptible immature leaves. They found that Ca sprays were of some use in checking tipburn where lettuce was grown for seed in the greenhouse. It is generally agreed that tipburn is most severe when both environmental and nutritional factors permit periods of very rapid leaf growth (*J. Amer. Soc. Hort. Sci.*, 94:372-376, 1969).