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1964 Bean Variety and Breeding Behavior

Horticultural Society to Meet November 18-20

Plan to attend the 79th annual meeting of the Oregon Horticultural Society November 18, 19, and 20 on the Oregon State University campus.

Vegetable Crop sessions will be held on Thursday, November 19. Emphasis will be on irrigation, pesticide residues, soil compaction, and farm management.

A combined meeting of the Small Fruits and Vegetable sections will be held all day Friday, November 20, to consider all aspects of soil fumigation.

The General Session and principal address will be on Thursday, November 20, and the Banquet will be that night.

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In This Issue . . .

Although yield and quality data for beans have not yet been fully analyzed, some of our 1964 notes appear below.

Pole beans: All tests of pole beans at the Vegetable Research Farm are now being placed in soil heavily inoculated with fusarium root rot. In 1964, the heavy infection obviously greatly reduced growth and yield of all Blue Lake varieties and lines currently in use in Oregon. Our new root-rot tolerant pole material is relatively late, with concentration of maturity only fair, and pods of questionable refinement. The lines are being hybridized with better pod types. Observation indicates that FM-1 (Prime Pak) is no more susceptible than other lines of usual Blue Lake parentage.

Some of the yellow mosaic resistant pole lines will be moved to replicated trial in 1965. Processing quality notes will be taken later this fall and winter. These lines appear to be near FM-1 in raw quality.

In our program involving pole beans resistant to rust, root rot, and yellow and common mosaic, heavy selection pressures have been applied this year via expanded testing in the disease area, and several new lines approaching Blue Lake in pod characters have been selected.

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N O T I C E OF E R R O R

The announcement regarding the meeting of the Oregon Horticultural Society on the front page of the Oregon Vegetable Digest October 1964 is in error. The correct information is below:

Oregon Horticultural Society to Meet November 18-19-20, 1964

Plan to attend the 79th annual meeting of the Oregon Horticultural Society November 18, 19 and 20 on the OSU campus.

Vegetable crop sessions will be held on Friday, November 20. Emphasis will be on irrigation, pesticide residues, soil compaction and farm management.

A combined meeting of the Small Fruits and Vegetable sections will be held all day Thursday, November 19,to consider all aspects of soil fumigation.

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Bean Variety and Breeding Behavior . . . (Continued from page 1)

Bush beans: The primary objective of bush bean selection work remains the placement of an essential Blue Lake pod on a highly desirable plant type. The difficulty of this assignment is no longer debatable among bean breeders of this and other countries. Yet progress, though slow, is being made. Line 206 of Rogers Bros. is one of the most interesting of the new bush beans from elsewhere. We have yet to evaluate the processed samples for this and other lines. We contemplate, however, one or more displays of this and other processed material in connection with industry meetings.

Several new bush lines derived from interhybridization of OSU Blue Lake backcross lines have been selected and are in early stages of increase on the research farm. These lines generally have the weak bush habit of earlier selections, but they are of interest because of distinct earliness, smaller and less leafy plants, and good pod setting ability. Some of the most promising have been selected through an exchange of breeding material with Dr. W. H. Gabelman and associates at the University of Wisconsin. It seems likely that the impact of somewhat higher temperatures there results in a clearer visible separation of highly sensitive types as compared to those which tend to set pods more readily. Under our conditions, pod set of some of these lines in 1963 and 1964 has been excellent. From other intercrosses of bush types derived from Blue Lake, selections with excellent pod refinement and less sprawliness have been made. These materials are also in the first stages of increase on the research farm.

Another new series of bush beans has been selected with heavy dosages of Blue Lake genes, but with more promise for habit and pod set than the older backcross material such as 949 and 2065. These habits are not as "ideal" as Tendercrop or Tendercrop mutants in growth habit, but it is believed that some may be of distinct promise. Pods of several of these lines closely approach Blue Lake in raw pod appearance and taste.

Further removed from Blue Lake pod quality is a large number of bush bean lines of more complex parentage; generally they have been selected for smaller plants, smaller leaves, and heavier concentration of pod set than any of the above lines. These lines are being used primarily for hybridization with better pod types to continue the consolidation of ideal plant and pod characters.

An additional category of lines, especially a closely related group of selections, involves a completely new combination of genes, not heretofore noted among the many hundreds of thousands of progeny observed in recent years. These lines have a very thin side-wall structure, low total fibre, mild taste, excellent lengths, fleshiness, smoothness, and a range of maturities. Some are small plants, with good pod:plant ratios; others are late and vigorous. Evaluation of the processed material will be limited the current year, but it is expected that seed of several of these selections will be sufficient for thorough quality testing in 1965.

Of the two bush green pod lines currently under modest increase for 1965 pilot trials, the 949-1864-2 line appears to be the best for pod set; pod quality is very near Blue Lake, but not as smooth nor as near FM-1 pole as the 2065 line. However, 2065 is later and more sensitive to the impacts of environment. It is also later maturing than 949. Increases of these lines in California and Idaho appeared, in August, to be satisfactory.

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Bean Variety and Breeding Behavior . . . (Continued from page 2)

Bush lines carrying combined resistance, or tolerance, to rust, root rot, and yellow and common mosaic have been isolated. The concentration of these genes, along with moderate (but not sufficient) Blue Lake germ plasm represents a new phase of bean improvement at this station. For efficiency, the convergence of these horticultural and disease-resistance characteristics will be given rapidly increasing attention. Large numbers of complex crosses have already been made and must be continued in order to meet these goals. In the assembly-line testing techniques, we are contemplating the addition of the bacterial blight organism, against which tolerance has been demonstrated from time to time in other areas-- more recently by Walker and others at the University of Wisconsin. A preliminary screening test in the field, at Woodburn, is under way this fall. It should, however, be clear that excellent tolerance in commercial type snap beans is hardly to be expected for some years (barring unforeseen developments) and that the recent recommendations of plant pathologists relative to bacterial blight-free seed and cultural precautions must be utilized to reduce or eliminate damage from the disease. At this time, all OSU breeding lines are free of the organism. On three occasions in the past we have had this organism appear at the research farm on bush bean plants grown from seed secured elsewhere. It was capable of moving into the OSU bush material derived from Blue Lake pole.

At the North Willamette station, F_2 and F_3 segregating progeny of bush Blue Lake derived materials, as well as bush Romano derived materials, were planted. We have become far more exacting in our criteria for selection in these early generations, yet several new selections of promise have been made there.

Within Romano bush material, the limiting factor, in those lines nearest Romano in raw appearance and taste, appears to be habit and leafiness. When these lines are built up into larger seed lots, it is obvious that cultural manipulation to reduce plant and leaf size should be given attention. In the meantime, we are intercrossing these types with others of better habit, but poorer pod, to combine desirable characteristics. At the North Willamette station some unusually early flat pod segregates have been selected from crosses involving Romano and other bean species.

Several new types of wax beans have been selected and a few are under limited seedsmen's increases. The W3340 series have often given the highest yields of any beans, including green pod types, in our plots. The small increase lots will permit processor trial in 1965 for pod quality factors. The major question involved is that of color--whether there is desirable yellow color in older pods and whether the green color of young pods is too persistent. Fibre in these lines is distinctly low, and taste is rather mild compared to other waxes.

A report on some of the yield and processing data will be given in a subsequent issue of Oregon Vegetable Digest.

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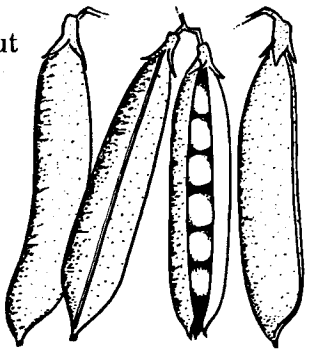
Blonding of Peas

Light yellowish-green peas contrast unfavorably with darker green ones in a commercial pack so that lots containing blond peas are lower in grade and value. The importance of the problem and its general causes are brought out in the following excerpts from correspondence with pea-industry personnel.



(1) ".....processors frequently blame seedsmen and their varieties for off colors. I have, however, deliberately induced blond peas in each variety under study to show that blonds occur in all varieties. The principal cause is lack of sufficient light energy to initiate the chemical change from protochlorophyll to chlorophyll. If the variety has large leaflets and the stand is thick, the passage of light is blocked and peas in the underlying pods remain yellow. Blonds may be induced by laying back over the test plots the vines that lodge out into the area between plots. This should be done just after flowering."

(2) "Blond peas are caused by low light intensity due to lush vine growth during cloudy weather. Peas with a green and yellow cotyledon were found in some lower pods where light intensity was marginal."

(3) "Blonds, as contrasted to genetic albinos, result from direct shading of the pods in which they are growing. Shading of other parts of the plant will not cause blonds. They are most abundant in fields where growth is heavy, and therefore are apt to occur when the yields are highest."

(4) "The cause of blond peas is lack of sufficient sunlight. This happens in two ways: (a) cool, cloudy season, (b) rank growth of vines. The second is most prevalent. Some varieties are more susceptible than others. The answer is to be found in high performing, good quality peas with short vine growth. Some blonding is present in any field with fertile soil and sufficient moisture for excessive vine growth."

(5) "In all cases where we have excessive vine growth, we get some blond peas. The condition is caused by shading of the peas by excess vines."

Several experiments and demonstrations were conducted in 1964 to obtain factual information on the causes and severity of blonding in peas. Two of these projects are summarized below.

Greenhouse experiment

Perfected Freezer 60 peas grown in gallon cans of field soil were subjected to the following treatments:

1. At different stages of growth randomly selected plants were enclosed in a tent which produced 50% shade.

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Blonding of Peas . . . (Continued from page 4)

2. Very small pods were enclosed in colored cellophane to exclude different wave lengths of light; others were enclosed in aluminum foil to exclude all light; and still other comparable pods served as checks.

3. Inverted cones of black roofing paper that permitted 8 to 10 inches of the vines to extend through the tops were fitted over some plants so as to place the lower half of the plants in dense shade.

Temperatures and light intensities in the various enclosures are recorded in Table 1.

Table 1: Effect of shade material on temperature of pods and on transmission of light

Shade material	Temperature (C) Mean 1/	Increase over check	Light transmission (Foot-candles)
None	71.4	---	5,800
Al. foil	72.5	1.1	-----
Blue cell. 2/	75.6	4.2	3,100
Yellow cell.	76.1	4.7	3,230
Red cell.	76.6	5.2	1,140
Orange cell.	76.8	5.4	2,450
Green cell.	78.3	6.9	2,600
50% shade cloth	----	---	3,500
Asphalt roofing cone	----	---	10

1/ Mean of 12 different observations May 14-29, 1964.

2/ Bleached almost clear after 14 days of exposure to light.

Pods were scored for color with 10 for best and 1 for poorest. Peas were blanched for three minutes and scored in the same way. The results of the greenhouse tests are summarized in Table 2.

Differences between various colored shading materials could be detected but varied widely among replications. Aluminum foil that excluded all light reduced the green color of the cotyledons in all cases. Fifty percent shade had no noticeable effect on the color of shelled peas. Plants shaded by cones of black roofing paper produced blond peas. Peas from check plants receiving about 5,800 foot-candles were green.

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Blonding of Peas . . . (Continued from page 5)

Table 2: Effect of shading of pods on blonding of blanched, shelled peas--1964 greenhouse experiment

Repl.	Check (Unshaded)	Color of cellophane					Aluminum foil
		Green	Red	Blue	Orange	Yellow	
1	9	9	9	9	9	9	-
2	9	9	9	9	9	9	-
3	9	9	9	9	9	9	-
4	8	4	4	6	5	6	-
5	10	8	9	5	9	8	3
6	10	7	6	8	7	4	3
7	10	7	7	5	5	7	3
8	6	9	9	8	6	6	2
9	7	7	7	5	6	5	6
10	10	9	8	8	9	7	5
11	8	9	8	7	8	8	8
12	10	8	6	9	6	7	9
Av. 5-8	9	8	8	7	7	6	3

1/ 1 = Blond and/or yellow, with no green present.

10 = Dark green.

Field experiment

Plantings of Perfected Freezer 60 were made April 16 and May 5 with a seed drill in a field previously fertilized with 700 pounds of 8-24-8 per acre. Stands were 14 plants per yard of row. Plantings were irrigated sufficiently to maintain vigorous growth.

Screens to produce 25%, 50%, and 75% shade were installed horizontally over randomly selected areas of each planting. The screens were attached to vertical supports in such a way that they could be raised as the beans grew taller.

In addition, selected flowers and developing pods were systematically enclosed partially or completely in aluminum foil. Flowers and pods of comparable development were tagged to serve as checks.

Peas grown under 25%, 50%, or 75% shade had slightly lower color ratings than the check plots but these differences were not consistent (Table 3).

Aluminum foil enclosing the pods increased the blonding. Partial coverage with aluminum foil resulted in blond peas in the covered zones.

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Blonding of Peas . . . (Continued from page 6)

Table 3: Effect of different degrees of shading on the color of blanched peas 1/

Date harvested	No. of days shaded	Check	Percent shade 25%	50%	75%
		First planting			
July 13	46	8.5	8.5	8.5	9.5
July 14	47	8.2	9.2	8.4	9.6
July 14	33	8.0	8.6	8.6	9.4
		Second planting			
July 30	63	10.0	9.5	8.0	8.0
July 30	49	10.0	10.0	---	6.5
July 30	35	10.0	7.0	6.5	---
Average:		9.1	8.8	8.4	8.6

1/ 1 =Blond and/or yellow, with no green present.

10 =Dark green.

Peas from pods exposed to full sunlight, when compared with peas from pods of the same age but shaded by adjacent vines, were greener (Table 3).

These experiments help to verify the suggestion that blonding in peas is a direct result of shading the pods. Any cultural practice that results in excessive vine growth, such as too much nitrogen or irrigation water or too many plants, will tend to increase the occurrence of blonding.

The most practical present solution appears to be the development of shorter plants with small leaf areas but with stems, petioles, and pods that function as leaves. Breeding programs with these objectives are well under way.

--M. T. Vittum
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Vegetable Note . . .

Size of seedlings, height of plants, and fresh weight of plants and yield were associated with size of lima bean seed in experiments conducted by Wester. He suggested that yields of lima beans could be increased if the seed were sized before planting and various seed sizes planted separately. (Proc. Amer. Soc. Hort. Sci., 84: 327-331, 1964.)

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