UNIVERSITY OF IDAHO
College of Agriculture

PAYETTE

A New Curly Top Resistant Dwarf Tomato Variety

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IDAHO Agricultural Experiment Station

Bulletin No. 387
June 1962

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Payette Tomato

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The University of Idaho has conducted research for more than 30 years in an attempt to solve the curly top problem of tomatoes. Curly top is a virus disease which often causes losses of entire tomato plantings in Idaho and other states west of the Rockies.

The original research program was limited to screening commercial varieties in search of resistance to the virus. The progeny of individual plants which survived exposure to curly top in the field were selected for further testing. These lines without exception were susceptible, and researchers realized that curly top resistance would not be found in commercial tomatoes.

A new interest in the curly top program began when accessions of wild tomato species were demonstrated to possess resistance to the virus. Thus, the wild tomato became the backbone of Idaho's tomato-breeding program for curly top resistance. The testing of interspecific crosses took many years. Progress in transferring resistance from the wild species to commercial varieties was slow and involved. The most difficult problem was to retain a high level of curly top resistance in the larger-fruited types.

Not until 1956 did the progeny of several interspecific hybrids exhibit good field resistance to the disease. In 1959 one of these lines was released by this station, under the name "Owyhee," and this release has held up well in curly top tests in Idaho although it needs improvement in fruit size and time of maturity.

Further research in the same breeding program using *Lycopersicon peruvianum*, Dun. and *Lycopersicon hirsutum*, Humb. and Bonpl., as sources of curly top resistance resulted in the new release, Payette, in 1961. The small Payette plant makes it ideal for suburban gardeners where space is limited. Its fruit is medium-to-large in size, desirable in the canning trade. Both grower concern over the high cost of hand picking and the development of mechanical harvesters has focused attention on varieties suited to this practice. Payette's fruit is concentrated in the center of the vine, making it easily accessible to pickers. Although this variety has not been mechanically harvested, its early, heavy set and compact vine would indicate a possibility for this type of harvesting. The small plant size allows much greater plant populations per acre which results in higher yields.

DESCRIPTION

Plant and foliage: Payette vines are dwarfed. Their thickened stems form a compact plant with an erect growth habit. Foliar growth is dense enough to supply shade for prevention of sunburn yet open enough to allow uniform fruit ripening. Space requirement for each plant is small compared to Sioux or the Owyhee grown in southwestern Idaho (Table III). Leaflets are medium in size, dark green, thickened and somewhat resemble a potato leaf.

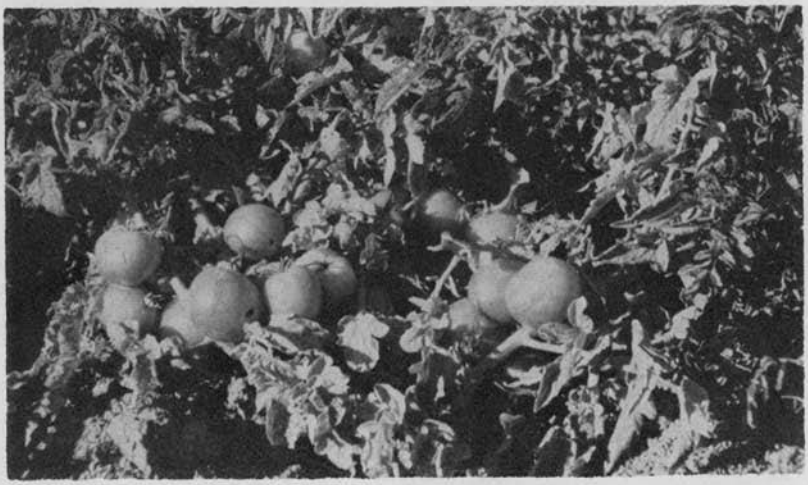

Figure 1. A field planting of the variety Payette. Note the heavy set and concentration of fruit on the small compact vine.

Fruit: Payette's fruits are globe-shaped, smooth, uniform, medium-to-large in size—4-5 ounces— and compare favorably with the Sioux variety when grown in southern Idaho. The stem cavity is small, slightly recessed, and smooth. The fruits are usually smooth at the blossom end with a small stylar scar. The tomatoes ripen uniformly and mature to a deep red color. The flesh is red, moderately "meaty," and has thick locular walls and septa. It possesses five to many locules. Seed cavities are small and not excessively juicy. The thick outer walls and fleshy interior make the Payette firm and heavy. A firm skin contributes to its ability to hold up during handling.

Maturity: Payette produces a heavy fruit-set early in the season. In trials during the last 4 seasons it matured earlier than either Sioux or Owyhee. Performance records over the years 1958, 1959, 1960, and 1961 indicate its maturity as 3-7 days earlier than Sioux (midseason-early) in southwestern Idaho. A comparison of the maturity dates can be made in Table III under the first picking yields of 1961. Sioux yielded 5.91 tons per acre for the first picking; Payette yielded from 14-21 tons per acre depending on plant spacing.

Table I. Percentage of tomato plants surviving the curly-top disease in experimental tests for a 6-year period at the Parma Branch Experiment Station, Parma, Idaho.

Variety	Replicated Test Plot					
	1956	1957	1958	1959	1960	1961
Owyhee	87	83	86	84	98	84
Sioux	0	0	0	0	28	0
Stokesdale	2	4	1	0	—	4
Payette	92	74	78	75	94	84

Table II. Percentage of tomato plants surviving the curly-top disease in commercial tests for a 6-year period at the Parma Branch Experiment Station, Parma, Idaho.

Variety	Commercial Tomato Field					
	1956	1957	1958	1959	1960	1961
Owyhee	95	97	100	90	95	94
Sioux	60	74	65	30	27	33
Stokesdale	63	72	70	46	—	35
Payette			98	78	94	84

Figure 2. The fruit are medium to large, globe shaped, with smooth shoulders. Note the smooth blossom end with small stylar scar.

PERFORMANCE TESTS

Disease: The Payette has field resistance to curly top superior to the commonly grown commercials in southern Idaho as demonstrated by the data in Tables I and II. Data in Table I indicate the severity of curly top in the replicated experimental test plot. Even under these severe conditions, a high percentage of Payette plants remained healthy.

Yields: Yield performance trials were conducted the past 4 years in an area where exposure to curly top was light so that yield potential could be compared with other commercial varieties. Plants for these trials were started from seed in the greenhouse and transplanted to the field the first of June, approximately one month later than commercial growers began planting. The Payette was planted on a 4 ft. x 4 ft. spacing in 1958, 2 ft. x 4 ft. in 1959 and 1½ ft. x 4 ft. in 1960 and 1961. In 1961, additional plant spacings were made at a 6 in. x 4 ft., 1 ft. x 4 ft. and a 2-row planting, alternately spaced at 1½ ft. on a 1 ft. bed (Table III). The yield data in 1961 included only 2 pickings as compared to 3 to 4 pickings in previous years. Only slight differences appeared between the yield of the 6 in., 1 ft., and the bed planting. The bed planting was more difficult to cultivate for weed control.

Table III. Tomato yield trials in replicated test plots in an area with light curly-top exposure.

	Yield in tons per acre of marketable fruit					
				1961		
Variety	1958	1959	1960	1st Picking	2nd Picking	Total 1st & 2nd Picking
Sioux	33.31	22.81	24.67	5.91	12.72	18.63
Owyhee	25.21	20.71	25.10	4.68	9.73	14.41
Stokesdale	25.95	16.88				
Campbell-135			16.28			
Campbell-146			14.70			
Rio Grande			24.66			
Alpha 7			21.55			
Kenosha			23.37			
Tecumseh			24.76			
Epoch[1]			19.29	4.26	6.48	10.74
Marbon			16.87			
Payette[1]	17.12[5]	27.60[6]	31.67[1]	14.18	9.85	24.03
Payette[2]				18.13	11.06	29.19
Payette[3]				21.73	10.51	32.24
Payette[4]				18.03	15.67	33.70

[1] Planted on a 1½ x 4' spacing.
[2] Planted on a 1' spacing.
[3] Planted on a 6" spacing.
[4] Planted on a 1½' spacing (2 rows planted on a 12" bed, alternately spaced).
[5] Planted on a 4' x 4' spacing.
[6] Planted on a 2' x 4' spacing.

LITERATURE CITED

(1) Simpson, W. R. The Owyhee Tomato. Idaho's Curly-top Resistant Variety. Idaho Agricultural Experiment Station. Bulletin No. 298. March 1959.