

Orchard Studies. No. 13. A Comparison of Growth and Yields of a "Regular" Group of Haralson Trees With an "Off-Stride" Group in the Same Orchard .

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Soon after the experimental orchard at the Fruit Breeding Farm came into bearing the yield records showed an interesting group of Haralson trees which bore their heaviest crops in seasons when most of the trees in the orchard were in their "Off Year". Similarly, when most of the trees in this orchard bore good crops in the "On Year" these "Off Stride" trees were in their "Off Year". As the trees in the "Off Stride" group were scattered throughout the orchard and were given the same management treatments it did not seem likely that their different performance pattern could be due to location or to soil conditions.

As the "Off Stride" pattern of these trees became more evident their yields were not included among the trees used in comparison of the fruiting performance of Haralson and Wealthy previously reported (Orchard Studies 12. May 1954). Inclusion of yields of this "Off Stride" group among records of variety performance would have given a distorted account of average yields of Haralson. To include yields of the "Off Stride" group in the years 1939, 1941, 1943, 1945 and 1947 when the "Regular Group" was bearing would have lowered the figures for average yields per tree below their true values. Also, to include the relatively high yields of the "Off Stride" group in the records for 1942 and 1944 would have raised the figures for average yields per tree above their true values for those seasons.

The records show that many of the trees in the "Off Stride" group were replants a year or two younger than those in the "Regular" group. Others in the "Off Stride" group were weaker than average trees in the orchard. Some of these habitually grew more slowly, or were small trees when planted.

First evidence of the difference between the two groups appeared in 1939 when trees in the "Regular" group were eight years old. Table 1. shows that in that year the "Regular" group produced an average of 2.5 bushels per tree, four times as much as average yield of the "Off Stride" group. No crop was produced in 1940, but in 1941 the "Regular" group bore on the average 5.9 bushels per tree three

Table 1. Yields of "Regular" and "Off Stride" Groups of Haralson Trees.

Year	"Regular" Pattern	"Off-Stride" Pattern
	20 trees	17 trees
1937	.7 bu.	.1 bu.
1938	.0 "	.0 "
1939	2.5 "	.8 "
1940	.0 "	.0 "
1941	5.9 "	1.8 "
1942	.6 "	5.2 "
1943	9.9 "	2.8 "
1944	.9 "	10.7 "
1945	2.5 "	.1 "
1946	.0 "	.0 "
1947	14.4 "	4.5 "

times as much as the trees in the "Off Stride" group.

During the next four seasons, from 1942 to 1945, the alternating performance of the two groups continued to attract attention. Table 1. shows that in 1942 the average yield per tree for the "Off Stride" group in their "On Year" of 5.2 bushels per tree was eight and one-half times larger than the average for the "Regular" group in its "Off Year". In 1943 the performance pattern was reversed when trees in the "Regular" group in their "On Year" produced 9.9 bushels per tree, three and one-half times as much as the trees in the "Off Stride" group in their "Off Year". The pattern was reversed again in 1944 with the "Off Stride" group bearing on the average 10.7 bushels per tree, twelve times as much as those in the "Regular" group which was having its "Off Year".

In 1945, when a late frost killed many blossoms, average yield for trees in the "Regular" group, in what would have been its "On Year", was materially lower than expected. But at the same time the "Off Stride" group, of somewhat weaker or younger trees, in the "Off Year" bore only a trace of a crop. Table 1. shows how the average yields of the two groups alternated between high and low in the seasons from 1941 to 1945.

In 1946, a "Black Freeze" with the temperature falling to 22°F. in the orchard on May 11 during full bloom completely eliminated crops of both groups. This freeze prevented expression of the expected relatively high yield of trees in the "Off Stride" group.

With the different production patterns of the two groups upset by the freeze of 1946, both groups bore crops in 1947. As the freeze of 1946 damaged foliage as well as blossoms all trees in the orchard were in a somewhat weakened condition in 1947. In spite of this set-back the "Regular" group bore an average of 14.4 bushels per tree whereas the weaker "Off Stride" group bore, on the average, only 4.5 bushels or only one third as much as trees in the "Regular" group.

Both groups of trees have shown clearly the persistence of the marked biennial bearing habit of the Haralson variety. It is apparent that the difference in the

bearing patterns of the two groups was not due to climatic conditions as both groups were exposed to the same fluctuations in temperature and rainfall. Apparently the volume of crop produced was the primary factor affecting bearing habit. Under commercial orchard conditions the Haralson variety has shown a marked tendency to set an over-load in the "On Year" followed by little or no crop in the following "Off Year". Both groups of trees included in this study followed this "On" and "Off" pattern although not in the same seasons.

During the years when crops were recorded, measurements were made of increase in trunk circumference of the trees as an indication of growth vigor. Figures for the annual increase in trunk circumference, together with relative yields, are shown in Table 2. After the trees began to bear good crops from 1941 on this table shows that growth, as evidenced by increase in trunk circumference, lacked vigor in years of heavy crops. In "Off" years they grew vigorously when not burdened by heavy crops and when the manufactured foods could be used only for growth.

The figures in Table 2, show, as in the crop records, that the different growth patterns of the two groups of trees were closely associated with the crop production patterns and did not appear to be related to soil, climatic conditions or orchard management practices.

Records of the two groups were discontinued after 1947. Due to winter killing of all spurs by severe late cold in March 1948, no crop was borne that season. Since then observations of the "Off Stride" group, relative to trees that were available for chemical thinning studies, indicate that some of the trees in that group may be returning to their former "Off Stride" production pattern.

Table 2. Annual Increase in Trunk Circumference of "Regular" and "Off-Stride" Groups of Haralson Trees in Relation to Crop Production.

Year	"Regular" Pattern		"Off-Stride" Pattern	
	Increase in trunk circumference in inches	Crop volume	Increase in trunk circumference in inches	Crop volume
1934	1.4	---	1.4	---
1935	1.3	---	1.2	---
1936	1.9	---	1.7	---
1937	1.6	---	1.4	---
1938	1.9	No crop	1.4	No crop
1939	1.6	Heavy	1.3	Light
1940	2.5	No crop	1.4	No crop
1941	.9	Heavy	1.8	Light
1942	2.4	Light	1.4	Heavy
1943	.8	Heavy	1.8	Light
1944	2.6	Light	1.0	Heavy
1945	.9	Heavy	1.3	Light
1946	2.5	No crop	2.1	No crop
1947	.4	Heavy	.7	Heavy