The Relationship Between the Number of Vines per Hill and Yield in Hops (Humulus lupulus L.)

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Hop growers have expressed considerable interest in the relationship between the number of vines per hill and yield. The common practice has been to train four vines per hill, two per string. This procedure may vary from one to three vines per string. Hop trials conducted at East Malling have indicated that the number of vines per string has much less influence on yield than does distance of planting.\(^1\) In addition they have drawn the following conclusions: (a) There is no advantage in training up three vines per string, except in the case of very weak varieties, as the yield is no greater than with two vines and cone development suffers. (b) When each string was furnished with only one vine the cone development was good and picking was easy, but with varieties of moderate vigor there was a reduction in yield. (c) With a vigorous variety the yield from one vine per string was practically equal to that of two vines. They further recommend that the varieties Brewer’s Gold and Bullion Hop should have only one vine furnished to each string when grown in yards where vigorous growth is made.

The data presented in this paper were collected from a vigorous planting of the variety Fuggles grown seedless in the Willamette Valley of Oregon in 1948.

Materials and Methods

An area consisting of approximately 1.1 acres, 25 by 30 hills, of the variety Fuggles grown seedless was harvested on an individual hill basis in a hop yard near Corvallis, Ore., 1948. This represented the fifth crop removed from the original planting. Plants were spaced at 8-foot intervals within and between rows. The number of vines per hill was recorded. The frequency of 2-, 3-, 4-, and 5-vine hills was included. Thus there were four yield arrays. Since vines per hill classes was at random within the area. The experiment was originally designed for the purpose of estimating the relative efficiency of various plot sizes and shapes rather than for the present investigation. Yields were weighed to the nearest tenth of a pound on a field weight basis. Bulk samples of green weights were taken for moisture determinations. Vines between hills were separated before lowering the wires prior to hand picking.

The statistical analyses were made on field weights since the dry-down percentage remained stable during the harvest period. These data were subjected to the following statistical analyses: (a) tests of normality for yield arrays within 2-, 3-, and 4-vine hills, (b) tests of homogeneity of variance between 2-, 3-, 4-, and 5-vine hills, (c) tests of homogeneity of yield for 2-, 3-, 4-, and 5-vine hills, and (d) the curvilinear regression equation of yield (y) on the number of vines (x) per hill.

Experimental Results

An estimate of the number of vines to use in hops for a maximum yield may be obtained by use of a regression analysis of yield (y) on vines (x) per hill. In this experiment x ranged from one to five inclusively. Thus there were four yield arrays. The regression theory assumes that each array follows the normal distribution and all arrays have the same variance. It was necessary to test these assumptions before proceeding with a regression analysis of the data.

The graphical method was used in inves-gating the validity of the assumption of normality. Cumulative frequencies of the yield of the 2-, 3-, and 4-vine hills were plotted on probability graph paper. The yields of the 5-vined array were considered rather than populations these points are not expected to fall exactly on a straight line. Since samples are being considered rather than populations these points are not expected to fall exactly on a straight line. Since samples are being considered rather than populations these points are not expected to fall exactly on a straight line.

The graph also yields information on the standard deviation of a normal distribution. The graph is the value on the vertical scale which corresponds to the 50% point on the horizontal scale. The standard deviation is the difference between the 50% and 84% points on the horizontal scale. These values for the vine hills are 8.4 and 6.9 as read from the graph. The computed mean and standard deviation of a normal distribution. The mean is approximately 6.9 and the standard deviation is 8.4. The computed mean and standard deviation of a normal distribution. The mean is approximately 6.9 and the standard deviation is 8.4.

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