A Method for Blind Node Evaluation

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Abstract

A quick visual method for evaluating blind node propensity is proposed. The method is based on the proportion of blind nodes on one-year-old shoots. The scores ranged from 1 as less than one third of the branch having blind nodes, to 9 as greater than two thirds of the branch having blind nodes. The correlation coefficient (r) of actual percentage of blind nodes was 0.84 indicating that this method will be useful to evaluate peach germplasm for blind node propensity.

Introduction

Blind nodes in peaches are the condition in which a node has no visual vegetative or reproductive buds (1, 2, 3). This condition is a common problem in low and medium chill peach production regions. Very little is known about blind node development and there is no standard rating method. This is probably because moderately affected cultivars usually reach an economic level of production. However, in areas that experience freeze during the dormancy and flowering, cultivars with abundant blind nodes have greater risk of low production because of the lower initial number of flowers. Tree training and pruning may not accomplish the desired result because not all nodes have the ability to form a new shoot. In addition, a blind node cannot be used as a budwood source for asexual propagation. The objective of this study was to develop a quick and reliable field method to evaluate blind node propensity for peach. The method can be used to aid a breeding program in germplasm evaluation.

Materials and Methods

Two visual rating methods were developed for quick determination of blind node propensity in the field. The blind node parameter method is a direct visual estimation of the percentage of blind nodes. The visual estimation is classified into five groups representing zero to 100% blind nodes with an increment of 20% (Table 1). The section parameter method estimates the proportion of the branch having blind nodes (Table 1). Evaluations were made on one-year-old shoots in March, shortly after trees broke dormancy and when blind nodes could be easily distinguished from normal nodes. Two five-year-old trees of each of twenty peach genotypes (Table 2) were evaluated by these methods in 1990. Each tree was scored by overall observation around its canopy. Two persons conducted the rating methods at the same time and the results were compared. In most cases the scores were the same. If the scores were different, a joint score was reached by discussion. Later, 10 randomly selected one-year-old shoots were taken into the laboratory where counts were made of normal and blind nodes, and the percentage of blind nodes [(number of blind nodes/number of total nodes) X 100] was calculated. The correlation coefficients (r) calculated by PROC REG (SAS Institute, Cary, NC) of the two visual rating methods and the percentage of blind nodes were determined to evaluate the accuracy of these methods.

Results and Discussion

The correlation coefficients of the percentage of blind nodes with the blind node parameter method (r = 0.77 ***) and with the section parame
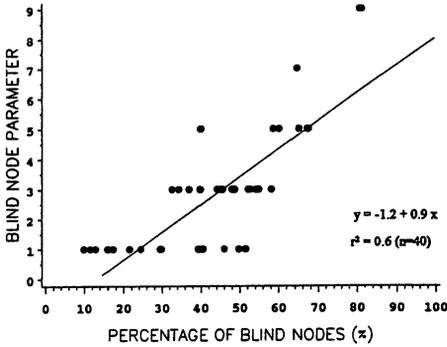
Figure 1. Regression of the blind node parameter method on the actual percentage of blind nodes.

ter method (r = 0.84 ***) were highly significant. The higher correlation coefficient of the section parameter method indicated it was a slightly better estimator for the percentage of blind nodes

Data from the blind node parameter method (Fig. 1) which showed the smaller correlation coefficient indicated that the actual percentage of blind nodes was underestimated in some cases. This would likely take place with samples having very high density of blind nodes formed late in the season on the terminal section of shoots. This made a score using the blind node parameter method less accurate.

The variation of blind node propensity was high. It ranged from less than 15% in Fla. 1-8 to 81% in 'Cherrygold' (Table 2) with half of the values between 30% and 55% blind nodes.

Table 1. Scoring of the blind node and section parameter methods for visual rating of the blind node propensity of peach genotypes.

Parameter method		
Blind note (%)	Section[z]	Score
0-20	<1/3	1
21-40	1/3	3
41-60	1/2	5
61-80	2/3	7
81-100	>2/3	9

[z]Proportion of blind nodes on a branch.

There were consistent genotype differences indicating blind nodes were under genetic control. The percentage of blind nodes within the same genotypes was correlated showing a high correlation coefficient (r = 0.54 *). Removing 'Sunhome' from the observation in which one tree had very poor growth due to drought stress, the correlation coefficient was 0.72 ***. This indicates that the degree of blind nodes within a genotype was consistent under the same environment.

Conclusions

Visual rating for blind node propensity was shown to be an accurate prediction of blind node percentage (r = 0.84). The preferred method was based on the section parameter which rated the proportion of blind nodes on one-year-old shoots. Since this method

Table 2. Genotypes and rating scores of the two visual rating systems for blind nodes.

Genotype	BNP[z]	SEC[y]	PBN[x] (%)
BY3-1197	2	2	44 ± 9
BY3-600	4	4	60 ± 15
BY4-7124	3	3	56 ± 16
BY5-938	5	4	59 ± 11
Cherrygold	9	9	81 ± 5
Desertred	1	1	16 ± 8
EarliGrande	4	3	37 ± 11
Elberta	2	3	47 ± 14
Fla. 1-8	1	1	11 ± 9
Flordaking	2	3	33 ± 10
Goldcrest	2	3	39 ± 14
Gulfpride	1	2	36 ± 21
June Gold	3	3	45 ± 13
Juneprince	3	3	51 ± 18
Loring	2	2	38 ± 19
P51-2	1	3	41 ± 17
Sentinel	3	3	42 ± 9
Springcrest	6	6	66 ± 7
Sunhome	3	3	40 ± 32
Sunland	1	3	45 ± 18

[z]BNP = Blind node parameter, mean score on two trees.
[y]SEC = Section parameter, mean score on two trees.
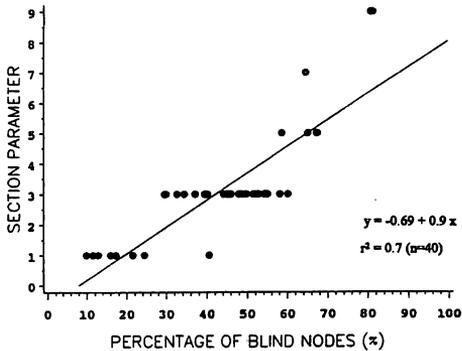[x]PBN = Percentage of blind nodes.

Figure 2. Regression of the section parameter method on the acutal perentage of blind nodes.

is quick and reliable, it is useful for field evaluation of blind node propensity. The blind node propensity was genotype specific which would indicate that selection against high levels of blind nodes would lead to the development of peach cultivars with less blind nodes.

Literature Cited

1. Blake, M. A. 1943. Classification of fruit bud development of peach and nectarines and its significance in cultural practice. New Jersey Agr. Expt. Sta. Bul. 706.
2. Dorsey, M. J. 1935. Nodal development of peach shoot as related to fruit bud formation. Proc. Amer. Soc. Hort. Sci. 33:245-257.
3. Faust, M. 1989. Physiology of temperate zone fruit trees. Wiley, New York. p. 294.

In Situ Differences in Fruit Color Development of Six 'Delicious' Apple Strains

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Abstract

Changes in fruit color of six 'Delicious' apple (*Malus domestica* Borkh.) strains were recorded in situ from 27 July through 21 September 1988 (149 days after full bloom). Fruit color was measured with a Minolta CR-200b portable tristimulus colorimeter at the midpoint between the stem and calyx end on fruit directly exposed to sunlight. Significant differences in color were observed among strains even at the first measurement date. Strains which had a darker red coloration at harvest tended to initiate earlier red color development. Strains varied in their rate of color development. In most strains rapid color development occured between the middle of August and the first week of September, by which time the strains tended to approach their ultimate color.

Fruit color is an important attribute of 'Delicious' strains and it influences both consumer acceptance (4) and sales (15). Furthermore, surface color is an important criterion in establishing U.S. grade standards for apples (16)

and poor coloration remains an important cause for reduction in grade 1). Consequently, a major criterion in the selection of new strains is their higher red coloration (6). Besides genetic variations among strains, color development in fruit is influenced by both cultural and environmental factors. Environmental factors that are important in color development of fruit include temperature (5) and light (7, 11).

Singha et al. (1991a) reported wide variations in both the amount and the distribution of anthocyanin in fruit of ten 'Delicious' strains at harvest. High-coloring strains had a significantly higher anthocyanin concentration on both the blushed and nonblushed surface when compared to low-coloring strains. However, information is lacking on whether color intensity at harvest is

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