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A Method for Blind Node Evaluation

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Abstract

A quick visual method for evaluating blind node propensity was proposed. The method was 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 usefull 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 can not 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 evaluation in the field. The blind node parameter method is a direct visual estimation of the percentage of blind nodes; and the section parameter method estimates the proportion of the branch having blind nodes (Tables 1 and 2). Two five-year-old trees of each of twenty peach genotypes (Table 3) were evaluated by these methods in 1990. 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. Each tree was scored by overall observation around its canopy. Later, 10 randomly selected one-year-old shoots were taken into the laboratory where counts were made of normal

Table 1. Scoring of the blind node parameter method for visual rating of the blind node propensity of peach genotypes.

Blind node (%)	Score
0-20	1
21-40	3
41-60	5
61-80	7
81-100	9

Table 2. Scoring of the section parameter method for visual rating of the blind node propensity of peach genotypes.

Blind node[z]	Score
Less than one third	1
About one third	3
About one half	5
About two thirds	7
Greater than two thirds	9

[z]Proportion of blind nodes on a branch.

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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 parameter 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.

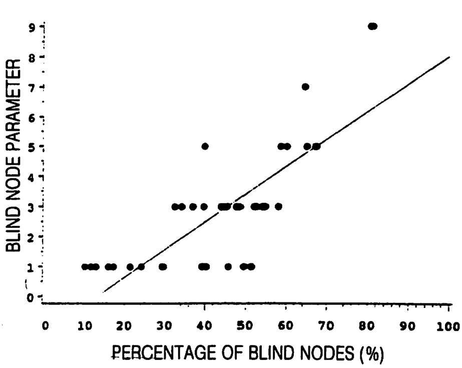

Figure 1. Regression of the blind node parameter method on the actual percentage of blind nodes. The linear regression model is y = -1.2 + 0.09x with r^2 of 0.6.

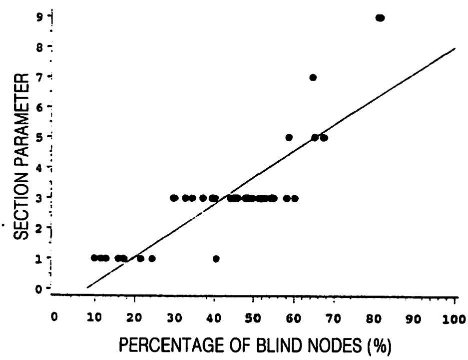

Figure 2. Regression of the section parameter method on the actual percentage of blind nodes. The linear regression model is y = -0.69 + 0.09x with r^2 of 0.7.

The variation of blind node propensity was high. It ranged from less than 15% in Fla. 1-8 to 81% in 'Cherrygold' (Table 3) with half of the values between 30% and 55% blind nodes. There were genotype differences which were consistent indicating that there

Table 3. 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
Junegold	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.

seemed to be genotypic dependence. 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 meant 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 is quick and reliable, it is usefull 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.

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Chilling Requirements of Apple and Pear Cultivars

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Abstract

The chilling requirements of 43 apple and 38 pear cultivars were estimated over a two year period (1990-92), by weekly sampling and forcing field-grown shoots. The results were expressed in terms of chill units (CU). In apples, the estimates ranged from 490 CU ± 1 for 'Dorsett Golden' to 1320.5 CU ± 8 for 'Cortland,' 'Marshall McIntosh' and 'Starking Delicious.' In pears, the estimates ranged from 749 CU ± 9 for 'Batjarka' to 1320.5 CU ± 8 for 'Poirier Fleurissant Tard.'

Introduction

Deciduous fruit trees of temperate zone origin enter a period of endogenously-controlled rest which must be overcome before growth can resume. In order to resume normal growth, buds must be exposed to chilling temperatures, the amount of which varies among cultivars and has been termed as the chilling requirement. The chilling requirement is, then, a limiting factor for commercial production of temperate zone fruit trees in areas with mild winters. Cultivars whose chilling requirements are fulfilled regularly in a given location must be selected in order to ensure successful production. This requires knowledge of the chilling requirements of the cultivars to be planted, as well as the chill unit accumulation that one can expect in the region where the cultivars are to be grown (15).

In warm regions, chilling accumulation is often insufficient to meet the chilling requirement of deciduous trees, resulting in uneven blossoming and reduced yield (2, 19, 21). Rest-breaking practices are usually needed to ensure uniform budbreak and growth. The ability to predict the termination of dormancy (estimate the chilling requirement) is of utmost importance

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