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# Estimating fruitfulness of grapevine buds by forced bursting in summer in the tropics of India

by

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## Schätzung der Fruchtbarkeit von Rebenknospen durch Austriebsförderung während des Sommers in den Tropen Indiens

Zusammenfassung. — Der potentielle Ertrag der Rebe im Klima Nordindiens kann geschätzt werden, indem man die Knospen an ausgewählten Tragruten zum Austrieb zwingt; an diesen wird im Juni gleich nach der Traubenlese der Holzschnitt vorgenommen.

## Introduction

Predicting the potential productivity of grapevine each season from an estimate of the fruitfulness of a sample of buds, determined by microscopic examination or forced bursting of buds by suitable methods during the later part of winter rest, has in recent years aroused considerable interest (1, 2, 3, 5, 6, 7, 10). It is recognized that the fruitfulness of buds determined by either of these two methods can be used in adjusting the severity of pruning to achieve a desired yield.

Much of this work has been done in temperate zone regions where the vine flowers and fruits only once in a year. It remains dormant after leaf fall in autumn till the following spring. To determine fruitfulness, the dormant buds have, therefore, to be dissected under a binocular microscope or treated for termination of rest period, so that the number of inflorescences on young shoots can be counted.

In contrast to the viticultural regions in temperate latitudes, North India presents a characteristic set of climate conditions distinguished by an intensely hot summer from April to June followed by a rainy season which lasts till September or early October. After the cessation of rains, the temperature rises for a few weeks before it falls to its minimum in winter, which extends from November to February. In this climate, the vine partially sheds its leaves and remains dormant during winter from November to February. It resumes its growth early in March and matures the crop in June. It produces a second flush of growth in July and remains in active growth during the rainy season from July to October.

Advantage can be taken of the high temperature and humidity during July and September in forcing the buds to grow by providing the stimulus of pruning and predicting the fruiting potential of the vine by direct count of inflorescences on the shoot arising at various bud positions. Such an early estimate of fruitfulness could be useful in advising the growers to adjust the severity of pruning their vines to achieve desired yield. This becomes necessary in view of the variation found in the quantum of fruit bud differentiation from year to year in our vineyards.

In this paper, the possibility of estimating vine fruitfulness by forced bursting of buds in July and September in field conditions has been examined.

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## Materials and Methods

Three-year old Bhokri (a table grape) vines growing in the vineyard of the National Botanic Gardens, Lucknow, were used in this field experiment. The vines were spaced 2 metres apart in the rows and 3 metres apart between the rows. They were trained on 2.1 m high arbour which consisted of a canopy of eight wires spaced 37.5 cm apart. Twenty vines of comparable vigour were partially pruned on 1st. July, 1967, keeping from 1 to 10 buds on the canes. Thirty canes in each of the pruning treatments were tagged for observations. Only the terminal bud positions were included in the study. The vines were again pruned in September, 1967, and January, 1968, when they were dormant, keeping 1 to 10 buds on the canes. Thirty canes were randomly selected and observed for percentage of fruitful shoots arising at each of the 10 bud positions. As in the case of the July pruned canes, only the terminal bud position were considered for the study. Thus, 20 vines were pruned each time and 300 canes observed for fruitfulness.

## Results and Discussion

The data on the percentage of fruitful shoots arising at each of the bud positions from 1 to 10 on the canes pruned in July and September 1967, and January 1968 are given in Table 1.

Table 1

Percentage of fruitful shoots arising from buds at node positions from 1 to 10 of Bhokri canes
Anteil der fruchtbaren Triebe aus Knospen der 1.—10. Insertion bei der Sorte Bhokri

| Node position | Time of pruning | | |
|---|---|---|---|
| | Juli 1967 ($x_1$) % | September 1967 ($x_2$) % | January 1968 (y) % |
| 1 | 0 | 0 | 28.5 |
| 2 | 38.8 | 37.5 | 39.5 |
| 3 | 37.5 | 36.8 | 37.8 |
| 4 | 51.7 | 57.1 | 51.7 |
| 5 | 58.3 | 60.0 | 58.1 |
| 6 | 56.0 | 58.3 | 58.5 |
| 7 | 65.3 | 60.0 | 66.1 |
| 8 | 70.0 | 66.7 | 67.8 |
| 9 | 63.3 | 64.7 | 66.6 |
| 10 | 75.0 | 70.0 | 73.2 |

To obtain the linear predictors of the functional relation between the above variates, the technique of multiple regression analysis was used and the coefficients of simple and partial regression were worked out (9). Both the coefficients were found significant at 5% level. The regression equations are:

(a) $y = 21.27 + 0.6496\, x_1$;

(b) $y = 21.27 + 0.6557\, x_2$;

(c) $y = 21.6197 + 0.9389\, x_1 - 0.2989\, x_2$;

where $x_1$ and $x_2$ and y have the meaning given in the Table. Using the equation (c) the expected values of fruitfulness were found to be in close agreement with the observed values of January pruning.

In the climate of northern India, inflorescence primordia in the buds of the grapevine are differentiated by the middle of April. Hence, it is possible to estimate fruitfulness by forcing the buds to grow on selected canes on the vines pruned soon after the harvest of the crop in June. This method obviates the necessity of microscopic examination of the buds or collection of buds in the field and treating them with dormancy-breaking chemicals. It is recognized that an early estimate of fruitfulness by this method cannot form a reliable basis for predicting final yields as pointed out by ALLEWELDT (2) and MAY (8). However, it can serve as an accurate basis for adjusting the level of pruning to the yield potential.

The data show that in Bhokri, the proportion of fruitful buds rises progressively from the base to the median portion of the cane, reaching its maximum between the 7th. and 10th. bud positions. As in the climate of northern India bud burst is confined largely to the first four buds from the cut ends of the canes, pruning the canes to 10 buds in June and counting the inflorescences arising from the 7th to 10th node positions will be sufficient for an estimate of the yield potential of the vine in the following season. Due to relatively poor bud burst and low percentage of fruitful shoots at the lower nodes, the exclusion of lower buds from the estimate of fruitfulness of the vine will not materially alter the estimate based on the four terminal bud positions. This is in contrast to the method of examining buds from node positions 4, 9 and 14 in Sultana vines in Australia (4) where bud burst is quite high, even at the lower bud positions.

## Summary

Potential productivity of the grapevine in the climate of northern India can be estimated by forcing the buds to grow on the selected canes which may be pruned in June, soon after the harvest of the crop.

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