NURSERY PERFORMANCE OF ROSE ROOTSTOCKS

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The nursery performance of five different rose rootstocks was studied. Observations on rooting success, plant height and the budding success were recorded. The 'Edward' stock gave the maximum percentage of rooting success and height of the plants. Rooting success was quite negligible (less than 3.0 per cent) in case of two wild stocks collected from Murree Hills. For budding three rootstocks, 'Edward', *Rosa damascena* and 'Gruss an teplitz' tried were at par. Among cultivars, 'Flamenco' and 'Fashion' gave higher budding success than 'McGredy's Sunset' and Queen Elizabeth'. Considering all factors, 'Edward' stock proved to be the best rootstock in nursery performance.

INTRODUCTION

The rootstocks are considered to be of fundamental importance in the rose industry. From the commercial viewpoint it is easy to see the advantage gained from using a rootstock. The use of bud wood as opposed to cuttings results in considerable saving, whilst the land required to plant a large number of stock plants for taking cuttings can be made available for the production of saleable plants. A good rootstock imparts certain desirable features to the scion cultivar. The features include a root system which has the ability to withstand drought, or undue checking caused by transplanting, adaptability to a wide range of soil types. A knowledge of the nursery performance of rootstocks can benefit the nursery men as well as amateure growers in raising the best plants with least cost by judicious application of the knowledge thus gained.

REVIEW OF LITERATURE

Lyle (1957) stated that few roses were grown on their own roots because of slow and usually inferior rooting of most varieties from cuttings. Garner (1958) reported that horticultural varieties of roses were propagated by grafting and budding on the young rootstocks, usually *Rosa canina* seedlings and also *Rosa manetti*. Hartmann and Kester (1960) mentioned that selected

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varieties of roses were commonly propagated by budding on the vigorous rootstocks, although the use of soft wood or hard wood cuttings, grafting, layering or the use of suckers was also sometimes practiced. Some of the rootstocks commonly used are *Rosa multiflora*, *Rosa canina* and *Rosa hugoinis*. Rowley (1961) stated that *Rosa multiflora* gave the best all round performance.

Roberts (1951) reported that the use of selected strains of *Rosa multiflora* rootstocks could significantly increase the percentage of successful union and reduced bud failure. Edland (1963) pointed out that purpose of budding cultivated rose on the wild rose was to provide it more quickly with a vigorous root system. According to Ticknor and Roberts (1968), the rootstock varieties exert a strong influence on the performance of scion variety. This effect is more pronounced on weak growing scion varieties which tend to be more specific in rootstock requirements than strong scion varieties.

Edwards (1955) reported that *Rosa canina* types 'Broy' and Pfander' gave the weakest growth while *Rosa canina* 'Pollmeriana' showed most vigorous growth, generally even more than *Rosa multiflora* followed by *Rosa canina* 'Kauth', *Rosa canina*, Hcinsohn. *Rosa canina* Sahmidos ideal and '*Rosa canina*' Senff' gave about medium growth. Celjadinova and Kukolev (1955) reported that the highest levels of starch in the stem and bud tissue, the highest percentage strike and the most vigorous growth occured in cuttings planted in autumn or early winter when the soil was moist and average daily temperature ranged from 5—10 C.

Stanko and Mithajlov (1966) found *Rosa canina* to be a suitable rootstock for bush and standard rose. It was vigorous with compact wood. It did not sucker readily and had only few thorn. In rootstock selection, Leemans (1967) considered the following growth characters as of major importance: (a) survival after planting in the field; (b) the percentage of successful bud unions, (c) the percentage of saleable plants, (d) average plant quality and (e) susceptibility to plant diseases and weather damage.

MATERIALS AND METHODS

These studies were carried out on two sets of experiments during the year 1968-69 in Horticulture Department of West Pakistan Agricultural University, Lyallpur. The experiments were laid out according to randomized complete block design. Five rootstocks, 'Edward', *Rosa damascena*', Gruss an Teplitz', and two different croses W1 and W2 growing wild in the Murree Hills tentatively identified as *Rosa macrophylla*', and *Rosa sericea*' were used in this experiment. A brief description of these rootstocks is given below.

(i) *'Edward'* Its botanical identity could not be traced. It grows up to 3-4 ft. It is an evergreen scandent shrub armed with curved prickles. Leaflets are dark green with the upper surface shining. Stipules are free rubulate and of deciduous type. It is locally known as 'Lahori'. It flowers duringn spring only. Flowers are medium small, double and of pink colour. It bears in clusters.

(ii) *'Rosa damascena'* is a prostrate shrub armed with curved unequal sized prickles mixed with prickly and glandular bristles. Leaflets are usually 5 in numbers, simply serrate. Cultivated commonly in gardens for its fragrant flowers, which are usually light pink in colour and imperfectly double. It is locally known as 'Gulkandi'. It also bears in clusters during spring season.

(iii) 'Gruss an Teplitz' has Imparipinnate compound leaf, adnate stipules spiny rachis, leaflets usually 5 in numbers, ¾ and 1½ inches long, with serrate, margin acute apex, glabrous surface and whitish green below and pale green above. Stem is cylindrical, green, solid and branching with normal prickles. It is locally known as 'Surkha'. It bears profusely in clusters, almost throughout the year. Flowers are of deep pink colour.

(iv) *Wild* I. It is tentatively identified as a strain of *Rosa macrophylla*. Leaves are 2 to 8 inches long, petiole are pubescent often glandular on the margins, broad and spreading leaflets, 1-1½ inches long, elliptic, usually nearly glabrous, pale beneath, finally simple serrate almost from the base. It has an erect stem with numerous prickles. It bears in clusters in spring. Flowers are of medium small size and single.

(v) *Wild II.* It seems to belong to the species, *Rosa serieca'*. Leaves are 2 to 12 inches long, petioles are pubescent, rarely prickly, stipules adnate to the petiole, articulate, usually not glandular. Leaflets are usually oblong, toothed only toward the blunt apex, glabrous above and rarely vilbus on both surfaces. Stem is solid, cylindrical and branching with normal prickles. It bears in clusters in spring. Single light pink flowers are of medium small size.

In all, 1800 cuttings of five rootstocks, described above were planted on 2nd February 1968. Nine-inch cuttings were inserted in the soil so that only one third top portion of the cuttings was left above ground. Thus, 200 cuttings of each rootstocks were randomized in nine blocks. Each block contained 5 units and each unit contained 40 cuttings, spaced one ft. apart in rows, 1½ ft. apart. All the plants received normal cultural operations.

Four scion cultivars, 'Queen Elizabeth', 'Flemanco', 'Fashion' and 'McGredy's Sunset' were budded on 'Edward', '*Rosa damascena*' and 'Gruss an Teplitz' in the middle of October, 1968 by T-budding method. The data on rooting of cuttings, growth rate of plants raised from cuttings, and budding success of scion cultivars were recorded periodically.

RESULTS AND DISCUSSION

Rooting of Cuttings. The data on the number of plants raised from the cuttings of the various rootstocks which survived till middle of September is presented in Table 1. Analysis of variance of the data revealed highly significant differences among various rootstocks. Maximum rooting success of 80.95 per cent was recorded for 'Edward' and 77.1 for 'Gruss an Teplitz'. Both were statistically at par with each other. These were followed by '*Rosa damascena*' (74.40%) statistically similar to 'Gruss an Teplitz' but inferior to 'Edward'. Rooting success was quite negligible, less than 3.0 per cent in the wild stocks.

The differences in rooting success among various rootstocks could be due to many factors. The cuttings of 'Edward', 'Gruss an Teplitz' and '*Rosa damascena*' were collected from the plants grown at Lyallpur. The wild stocks used in these studies, grow naturally in the Murree Hills and their cuttings were collected from there. Obviously, the cuttings from the two locations, Lyallpur and the Murree Hills were in different physiological conditions. It has also been established that species and cultivars differ widely in their capability of rooting of cuttings. A relationship between rooting of cuttings and the starch contents of the cuttings at the time of their planting has been indicted.

TABLE 1 : *Percentage of plants raised from the cuttings of five different rootstocks, which survived till the budding time.*

Rootstocks	Rooting success (per cent)
Edward	80.95a
Gruss an Teplitz	77.16ab
Rosa damascena	74.40ab
Rosa macrophylla	2.90c
Rosa sericea	0.12d

Plant Height. The data on final height of the plants as recorded on 11-9-68 is given in Table 2. The plants of 'Edward' rootstock were comparatively taller in the beginning and kept this superiority during their growth period. The plants of '*Rosa damascena*' were next in order and taller than those of 'Gruss an Teplitz'. These differences in the height of three rootstocks were observed throughout the period of growth.

TABLE 2 : *Height of plants of three different rootstocks raised from cuttings.*

Rootstocks	Height (cms.)
Edward	82.53a
Rosa damascena	64.27a
Gruss an Teplitz	46.79b

According to the analysis of variance the differences were highly significant. The maximum mean height of 82.53 cms. for 'Edward' was significantly better than 'Gruss an Teplitz' (46.79 cm). However, '*Rosa damascena*' (64.27 cm) and 'Gruss an Teplitz' were statistically at par with each other. Alam (1968) reported that the maximum height was measured for 'Edward' stock followed by 'Damascena', 'Gola' and 'Gruss an Teplitz'.

As a matter of fact, height alone does not give the true indication of the total growth of the rose plants. Many species/cultivars grow erect while others may be semi erect or sprawling. Similarly many species/cultivars produce large number of branches, while in others the apical dominance is so great that only few branches are thrown by the plant. These characteristics of the plants are determined by the genotype-environment relations. According to Abrams (1962), the growth habit and vigour of the rootstocks must influence its ability to absorb water and essential chemical elements from the soil by determining the volume of soil with which it is in contact.

Budding success of scion cultivars on various rootstocks. The statistical analysis of the data on budding success of various rootstocks as presented in Table 3 has revealed non-significant differences among the various rootstocks. However, 'Fashion' and 'Flamenco' cultivars showed comparatively higher budding success i.e. 79.1% and 76.4%, respectively than 'McGredy's Sunset' (64.77%) and 'Queen Elizabeth' (67.2%) on all the rootstocks.

Roberts (1962) argued that the significant influence of stock and scion on number of successful unions must be attributed to differences in the

TABLE 3 : *Budding success of four scion cultivars on three different rootstocks*

Rootstocks	Cultivars	Mean budding success (Per cent)
Edward	'Queen Elizabeth'	75.0
	'Flemanco'	91.4
	'Fashion'	92.1
	'McGredy's Sunset'	95.5
Rosa damascena	'Queen Elizabeth'	77.4
	'Flemanco'	79.1
	'Fashion'	93.6
	'McGredy's Sunset'	95.4
Gruss an Teplitz	'Queen Elizabeth'	89.6
	'Flemanco'	83.0
	'Fashion'	94.6
	'McGredy's Sunset'	88.3

physiological conditions of the two plant components at the time of budding rather than to incompatibility, technique of budding or adverse environmental relationship.

It can be concluded from the results of these studies that on the basis of nursery performance, 'Edward' stock proved to be the best.

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