

**RAISING OF SOME CUTFLOWER ROSES UNDER
POLYHOUSE CONDITION ON DIFFERENT ROOTSTOCKS
AND EFFECT OF POTASSIUM ALUMINIUM SULPHATE
[KAl₂(SO₄)₃] IN PROLONGING THE VASE LIFE
OF THESE CUTFLOWERS**

THESIS

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Indira Gandhi Agricultural University, Raipur
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MASTER OF SCIENCE

IN

**AGRICULTURE
(HORTICULTURE)**

By

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1996

INDIRA GANDHI AGRICULTURAL UNIVERSITY, RAIPUR
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Date : 30-12-96

CERTIFICATE - I

This is to certify that the thesis entitled "RAISING OF SOME CUTFLOWER ROSES UNDER POLYHOUSE CONDITION ON DIFFERENT ROOTSTOCKS AND EFFECT OF POTASSIUM ALUMINIUM SULPHATE [KAI₂(SO₄)₃] IN PROLONGING THE VASE LIFE OF THESE CUTFLOWERS" submitted in partial fulfillment of the requirements for the degree of "MASTER OF SCIENCE IN AGRICULTURE" (HORTICULTURE) of the Indira Gandhi Agricultural University, Raipur (M.P.) is a record of the bonafide research work carried out by SHRI ANIL KUMAR SINGH CHAUHAN under my guidance and supervision. The subject of the thesis has been approved by student's Advisory Committee and the Director of Instructions.

No part of the thesis has been submitted for any other degree or diploma or has been published /published part has been fully acknowledged. All the assistance and help received during the course of the investigations have been duly acknowledged by him.

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Shri P. Dubey

Chairman of the Advisory Committee

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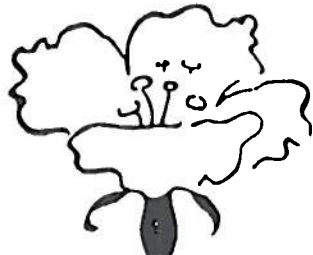
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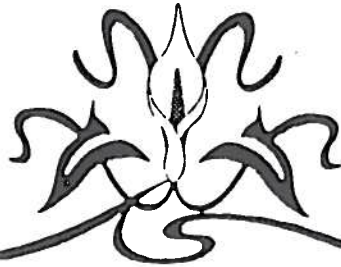
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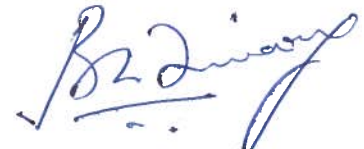


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CERTIFICATE - II

This is to certify that the thesis **RAISING OF SOME CUTFLOWER ROSES UNDER POLYHOUSE CONDITION ON DIFFERENT ROOTSTOCKS AND EFFECT OF POTASSIUM ALUMINIUM SULPHATE [KAl₂(SO₄)₃] IN PROLONGING THE VASE LIFE OF THESE CUTFLOWERS** “ submitted **SHRI ANIL KUMAR SINGH CHAUHAN** to the Indira Gandhi Agricultural University, Raipur (M.P.) in partial fulfillment of the requirements for the degree of “**MASTER OF SCIENCE IN AGRICULTURE**” (HORTICULTURE) in the Department of Horticulture, has been approved by the student’s Advisory Committee and External Examiner after an oral examination on the same.



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Raipur


(ANIL KUMAR SINGH CHAUHAN)

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INTRODUCTION

CHAPTER - I

INTRODUCTION

Some words instantaneously suggest beauty because they are associated with things that afford pleasure and delight. The word ROSE is one of them.

Rose is the one of the nature's most beautiful creations and is universally acclaimed as the Queen of the flowers. No other flower is a better symbol of love, adoration, innocence and other virtues than the rose. Dr. Zakir Husain (Former President of India) said that "If there were no roses how much the poorer this world would be".

The flower rose (Rosa spp) belongs to the family Rosaceae. There is a tremendous demand of this flower for aesthetic as well commercial purpose. Besides Indian rose has got a good demand in European and Asian markets.

In global terms United States and Germany import roses on large scale. U.S.A. accounts for approximately 39% of total sale of fresh flowers (Price and Robertson, 1982). Out of total money spent for purchase of flowers, the French spend 40% for roses, the German 20% and the Dutch 15%. (Mukherjee, 1991).

The world wide consumption of floriculture products is estimated to be worth \$40 billion and the global floriculture industry is growing at an annual rate of 10% to 15%.

Cultivation of roses in India is usually done in open conditions. But climate becomes a limiting factor. Monthly, weekly or even daily fluctuation in temperature, light intensity and humidity not only affect the quality of flower but also limit their production. So in order to produce consistently good quality and quantity of cutflowers protected environment of Green houses, Glass houses or polyhouses are necessary.

India can be divided in to three main zones for plasticulture purpose viz

- (1) Wet humid as of South and Coastal areas characterized by frequent tropical rains and warm temperature,
- (2) The central plains and desert area - characterized by moderate rain arid wide fluctuating temperature in winter (0° C) and summer (42° C),
- (3) Hilly North and North-Eastern part of India having moderate to high rainfall with freezing or below freezing temperature in winter to moderate temperature in summer. (Chadda et al., 1992)

Raipur is located under central plain zone.

Cutflower roses have a good market in Raipur specially during the festive season of Dashahra, Diwali and during marriage season. Most of the cutflowers used are either brought from Nagpur or Calcutta with a very little contribution from the local growers. To augment this demand

from local production it is necessary that proper cultivars (suit local agroclimatic conditions) be recommended to the growers along with suitable package of practices for rose cultivation, since only cultivars with the characteristics quality of good cutflower would be acceptable in the market. Towards this end four cultivars with flowers suitable for cutflower purpose (viz long sturdy flower stalks with well formed buds) were used along with three widely used rootstocks in an experiment to assess their raising under polyhouse condition. These cultivars were also assess for their vasselife.

The objectives of the experiment were -

- (i) To evaluate the different rootstock-scion combinations for budding purpose under polyhouse condition.
- (ii) To evaluate the suitability of these combinations for cutflower production under polyhouse condition.
- (iii) To study the influence of the Potassium Aluminium Sulphate with Sucrose Solution for prolonging the Vase life of these cultivars.

REVIEW OF LITERATURE

CHAPTER - II

REVIEW OF LITERATURE

An experiment entitled 'Raising of cutflower roses under polyhouse condition on different rootstocks and effect of Potassium Aluminum Sulphate [$KAl_2(SO_4)_3$] in prolonging the Vase life of these cutflowers'. The relevant literature available on this aspect has been briefly reviewed in the following chapter.

2.1 RAISING OF CUTFLOWER ROSES UNDER POLYHOUSE CONDITION :

2.1.1 Rootstocks suitability for budding :

Roberts (1962) showed, that the use of selected strains of *Rosa multiflora* could significantly increase the percentage of successful union and reduce bud failure from pinch off.

Pal (1966) found that *Rosa multiflora* is predominant rootstock in America. While Edouard rose continues to be the major rootstock for northern plains.

Mattos and Ferrante (1971) found that when *Rosa multiflora* rootstock, 20 cm. in length, was grafted with scion of cv. 'Happiness'. Showed the best as regards bud take, time taken to produce the first bud, plant height and vigour.

Singh (1972-74) reported that bud take was better on *Rosa bourboniana* and *Rosa multiflora* than on *Rosa moschata*, when these were used as for the cvs. 'Picadilly', 'Montezuma' and 'SuperStar'.

Swarup and Mallik (1974) reported from Delhi and Hissar respectively that *Rosa indica* var. *odorata* as stock was good for plant vigour and flower production from a trial on 13 different rootstocks with Rose cv. 'Priyadarshini' under Delhi conditions.

Pandey and Sharma (1976) reported that *Rosa multiflora* was found superior in respect of bud take, bud sprout, plant vigour and floral bud production over *Rosa bourboniana* and *Rosa indica* having best scion combination with cv. 'Montezuma'.

Sharma (1979) found that *Rosa indica* var. *odorata* proved better rootstock than other commonly used rootstocks namely *Rosa bourboniana* and *Rosa multiflora* under Hissar conditions.

Singh (1980) found that scions of HT rose cv. 'Montezuma', 'SuperStar' and 'Picadilly' grew more vigorously on *Rosa multiflora* than *Rosa bourboniana*.

Mukhopadhyay (1982) reported that the rose cvs. 'Happiness', 'Queen Elizabeth' and 'SuperStar' gave better results on *Rosa multiflora* than on *Rosa indica*.

Lal and Seth (1984) found that buds of cv. 'SuperStar' gave better results of bud take in May on *Rosa multiflora* than three other rose species.

Chadda (1986) reported that maximum bud take was observed when *Rosa multiflora* was used as a rootstock. Rose cv. 'Happiness' budded on this rootstock produced significantly more number of good quality flower than when it was budded on *Rosa indica* in I.I.H.R., Bangalore.

Kaicher and Dhayani (1986) have been found that *Rosa indica* was suitable for North Indian plains particularly for saline soil and *Rosa multiflora* proved its superiority on acidic soil in Bihar, Bangalore and TamilNadu. They also found that Edouard rootstock is common all over the country.

Mukhopadhyay and Bankar (1986) reported that thornless rootstock and *Rosa multiflora* gave good results when cv. 'Happiness' was budded on them.

Chandramohan and Kaicher (1990) reported that *Rosa indica* var. *odorata* was superior for plant vigour and flower production followed by 'Thornless', *Rosa canina*, *Rosa manetti* and *Rosa bourboniana*.

Sen (1990) found that in general the rootstock *Rosa multiflora* performs well in coastal region of India, peninsular India, Southern slopes of Vindhya mountain range, West Bengal, Bihar, Karnatka, Maharashtra, Sub Himalyan regions of Nainital and Dehradun.

Gowda (1992) reported from Bangalore, that among the rootstocks *Rosa multiflora* performed better followed by *Rosa indica* and *Rosa bourboniana* over *Rosa canina* and *Rosa laxa*.

Arora (1992) found that *Rosa indica* var. *odorata* proved better rootstocks than others.

2.1.2 Polyhouse and their effect :

Gill and Atwal (1976) observed that in North West India during Dec-Jan., for maintaining the supply of, and obtaining quality flowers, heating of polyhouses was required.

Gill and Atwal (1979) reported that when flower bed of rose cv. 'SuperStar' were covered with polythene tent during the day and night, they produced higher yields of flowers than obtained from the beds, maintained in open.

Randhawa (1986) reported that rose cvs. 'Christian Dior', 'Eiffel Tower' and 'Raktagandha' performed well when plants were covered by polythene sheet continuously [24 hours].

Dadlani et al. (1990) working with gladiolus, Neelophar (1992) with carnation, Mukherjee (1995) also with carnation have reported better results of flower production under polyhouse than open condition.

2.1.3 Selection of scion and Time of budding :

Pal (1966) suggested that 'eyes' which are visibly plump but have not yet started to elongate and grow, should be chosen for budding.

Rupprecht (1971) observed that a careful selection of scion-bud from mature vigorous mother plants ensured better success in budding of roses.

Nanjan and Kumar (1983) found that the mean bud take percentage was over 80 for period from January to June; it declined to 52-55% in *AUGUST AND SEPTEMBER* and then rose again.

Sheet (1987) reported from West Bengal that in rootstock *Rosa indica*, February is the best month for budding.

2.1.4 Spacing (plant density) of cutflowers :

Anonymous (1988) showed that a closer spacing of 20x30 cm in cv. 'Montezuma' (1,66,666 plants/ha) has been recommended for obtaining economic yield from a unit area.

Bhattacharjee (1992d) reported that maximum production of flowers per unit area was obtained with closer spacing and also the plant height was more with intact flower.

2.2 ENHANCEMENT OF VASE LIFE OF CUTFLOWER :

2.2.1 Time of cutting of cutflowers for Vase life :

Bhattacharjee (1992b) concluded from experiment that the potential useful life of cut roses of 'SuperStar' can be lengthened if the buds are harvested at a stage when one to three petals out curves from the tip. In case of 'Raktagandha' better results can be obtained with all calyx out curved or when only one petal curves from the tip.

Bhattacharjee (1993c) found that the time of harvest affected the Vase life. The flowers harvested between 4 to 6 P.M. increased the Vase life of 'Priyadarshini' roses.

2.2.2 Enhancement of Vase life by chemicals :

Karthikeyan (1971) reported that Potassium Aluminum Sulphate had great influence on cv. Landora by the germicidal and bactericidal effect and extended the Vase life of cutflowers.

Amariutei and Panait (1981) reported that Potassium Aluminum Sulphate was effectively used to extend the Vase life of cutflowers.

Naik (1989) reported that Potassium Aluminum Sulphate increased the Vase life of rose cultivars by 3 to 5 days at concentration of 50 mg/lit solution with 20 mg /lit sucrose.

Rath et al. (1991) found that Silver nitrate and allum solution at varying concentration increased water uptake and also extended the Vase life of 3 rose cultivars.

Mohanty et al. (1993) found that maximum enhancement of Vase life was seen in cultivar 'Landora' at 50 mg/lit of Potassium Aluminum Sulphate with 20 mg/lit sucrose.

2.2.3 Importance of sugar in enhancement of Vase life :

Borohov et al. (1976) observed that sucrose decrease the accumulation of different ions in the flower and other part of the stems. These ions initially increase the water uptake rate and finally resulting in increase of Vase life of flower.

Amariutei *et al.* (1982) suggested that 4% sucrose can be taken with the combination of 0.1% Potassium Aluminum Sulphate and 0.02% Potassium chloride or 0.1% Copper sulphate and 0.02% Sodium chloride. This results in the Vase life of flower being prolonged by 4-6 days than in water.

Gowda (1987a) reported that 2% sucrose with 0.3% $Al_2(SO_4)_3$ increase the Vase life of rose cultivar 'Montezuma' for 4 to 5 days more.

2.2.4 Cause of flower benting (in Vase life) :

Burdett (1970) suggested that water stress which is characterised by neck drop and wilting of leaves and flowers is due to lack of turgidity which may be brought by the failure of stem to taken up sufficient water or by excessive evaporation or by a combination of the two.

Rogers (1973) suggested that xylem blockage is a major cause of water deficit and wilting of cutflower.

MATERIALS AND METHODS

CHAPTER - III

MATERIALS AND METHODS

This chapter describes the Technical programme of work including the experimental details, location and agroclimatic conditions and technique employed in the present study.

3.1 Location and agroclimatic conditions :

The Indira Gandhi Agricultural University is located at Raipur, which is in dry sub humid agroclimatic region. It is situated in the south eastern part of Madhya Pradesh. Popularly known as Chhattisgarh at $21^{\circ}.16'$ N latitude and $81^{\circ}.36'$ E longitude and at an altitude of 289.56 meters from mean sea level. It is the biggest town in the Chhattisgarh plain region of the state. The average rainfall of this region is 1000-1350 mm, most of which (about 85%) is received during monsoon (June to September) and the rest during post monsoon and winter season.

The meteorological details about the weather prevailing during the crop period, have been presented in Table 1.

Table 1 : Meteorological details about the weather prevailing during course of study.

Month	Standard meteo- logical weeks	Temperature (°C)		R.H. (%)	Sunshine (hours)	Rain- fall (mm)	Wind Velo -city (km/hrs)
		Max.	Min.				
Aug.	34	30.2	23.6	85	3.7	7.2	2.3
	35	30.9	24.6	83	4.5	4.0	2.8
Sep.	36	31.2	23.9	87	4.0	22.8	1.5
	37	32.7	24.8	83	7.7	8.7	0.8
	38	31.8	24.0	81	7.1	0.0	1.6
Oct.	39	32.9	24.2	77	9.6	1.0	1.3
	40	30.7	23.6	81	6.5	4.7	3.9
	41	30.9	18.8	71	9.6	0.0	0.9
	42	30.5	18.5	67	8.3	0.0	1.5

Fig. 1 Weekly Meteorological Data During Period of Experiment

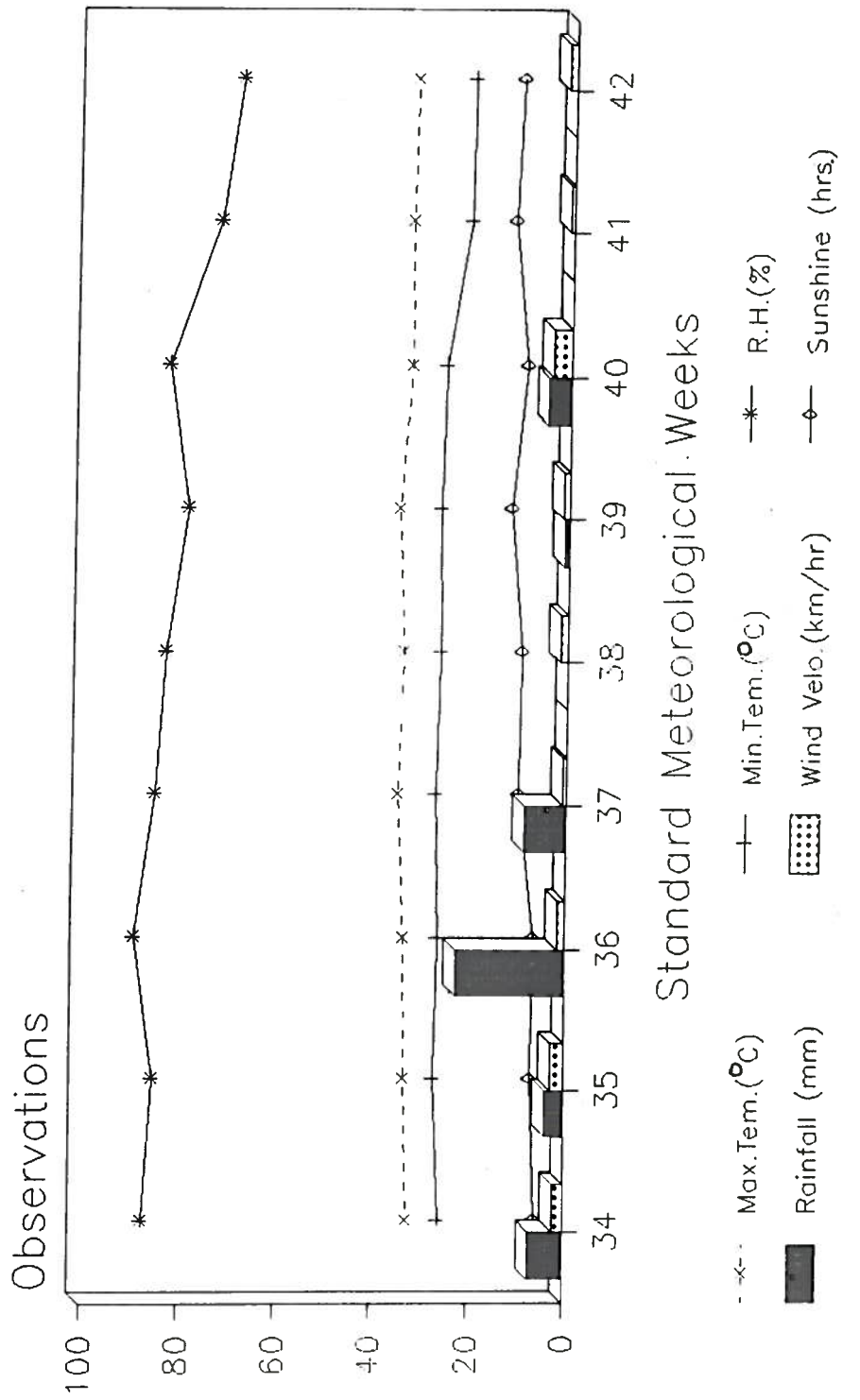
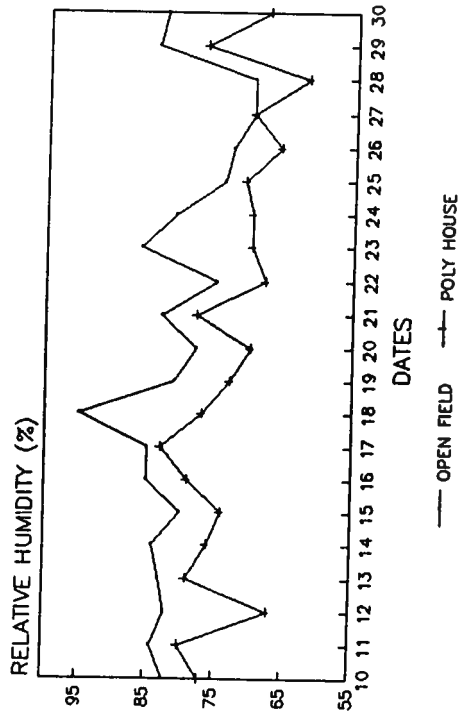
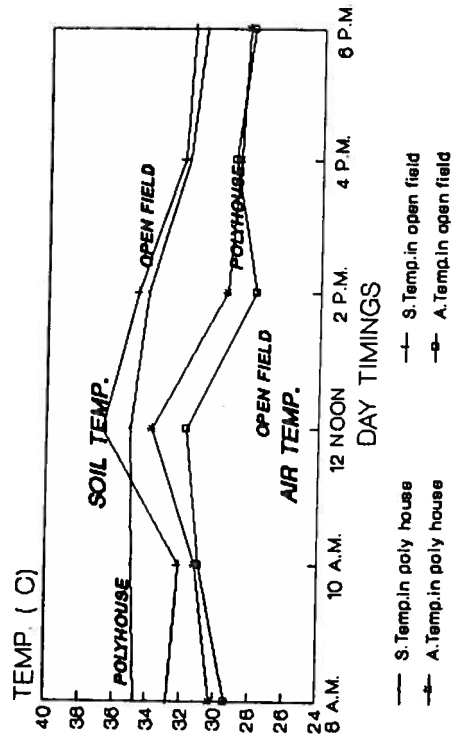


FIG.2 : OBSERVATIONS WITHIN POLYHOUSE

A COMPARISON OF OPEN FIELD & POLYHOUSE R. H. IN THE MONTH OF SEP., 1996



A COMPARISON OF SOIL & AIR TEMP. UNDER POLYHOUSE & OPEN FIELD CONDITION



3.2 Site of experiment and conditions within polyhouse :

The experiment was conducted in the "POLYHOUSE" at the Department of Horticulture Nursery, I.G.A.U., Raipur.

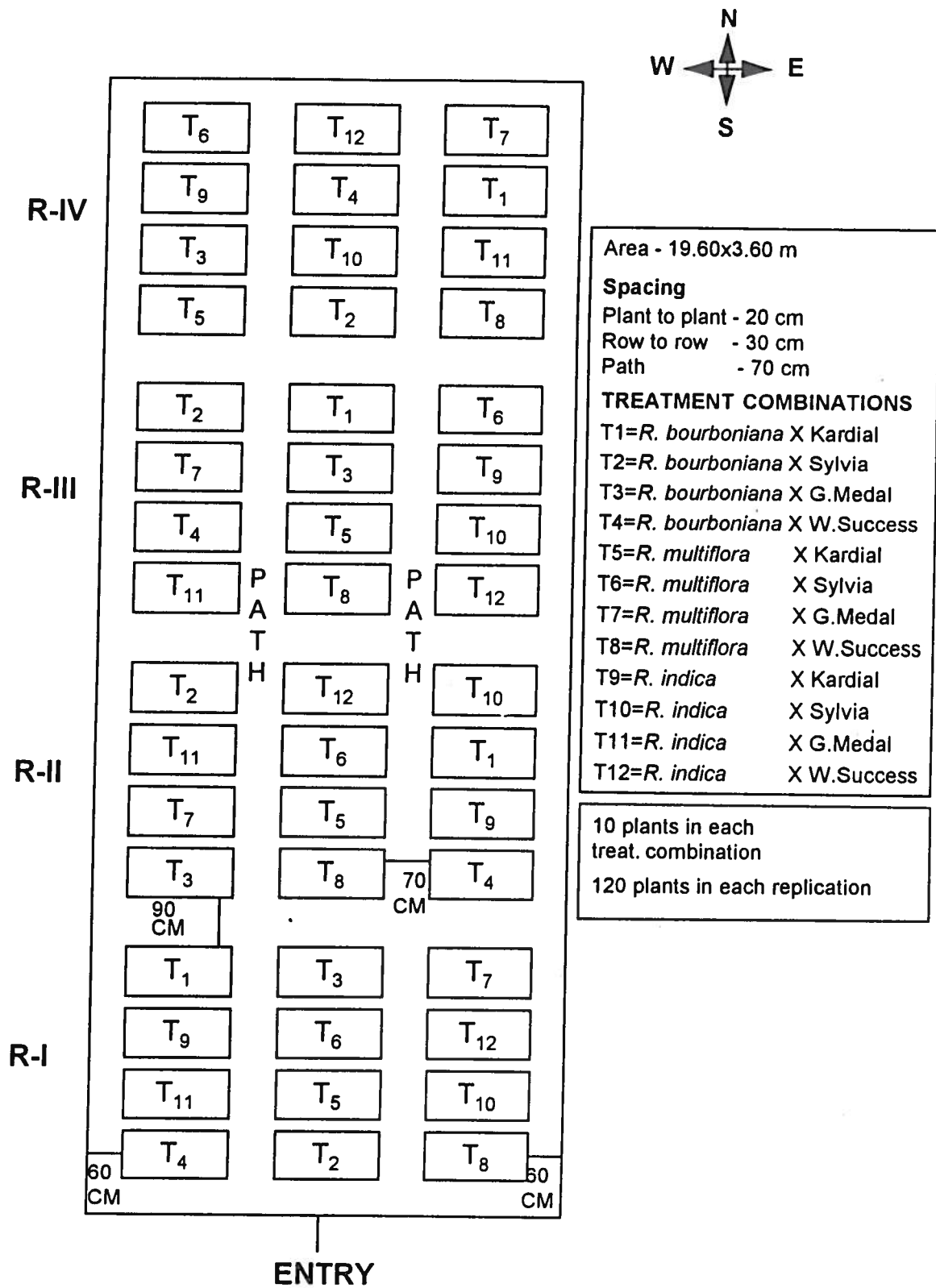
The polyhouse is a covered area of 19.60 X 3.60 m provided with mist and exhaust system. The ambient Air temp, relative humidity and soil temp within the polyhouse and outside during course of study were recorded and have been presented in illustration 2.

3.3 LAYOUT OF THE EXPERIMENT :

The experiment details

The experiment was laid out in factorial R.B.D.. There were twelve treatment combinations using three different rootstocks and four cutflower cultivars of roses within four replication. The rootstocks and the cutflower cultivars used as follows -

Rootstocks	Notation	Cultivars	Notation
<i>Rosa bourboniana</i>	R0	Kardinal	V1
<i>Rosa multiflora</i>	R1	Sylvia	V2
<i>Rosa indica</i>	R2	Gold Medal	V3
		White Success	V4



3.4 PLAN OF LAYOUT IN POLY HOUSE

The Treatment combinations as follows :

Treatment combinations	Notation
<i>Rosa bourboniana</i> x Kardinal	T1
<i>Rosa bourboniana</i> x Sylvia	T2
<i>Rosa bourboniana</i> x Gold medal	T3
<i>Rosa bourboniana</i> x White success	T4
<i>Rosa multiflora</i> x Kardinal	T5
<i>Rosa multiflora</i> x Sylvia	T6
<i>Rosa multiflora</i> x Gold medal	T7
<i>Rosa multiflora</i> x White success	T8
<i>Rosa indica</i> x Kardinal	T9
<i>Rosa indica</i> x Sylvia	T10
<i>Rosa indica</i> x Gold medal	T11
<i>Rosa indica</i> x White success	T12

3.5 Observations recorded :

Following observations were recorded :

3.5.1 Percentage success of bud **take** after 15 days of budding.

3.5.2 Days to bud sprout after budding.

3.5.3 Percentage of bud sprout after budding.

3.5.4 Number of leaves on the budding after 30 days of budding.

3.5.5 Number of branches of budding after 30 days of budding.

3.5.6 Number of days to bud emergence after budding.

3.5.7 Number of days to first flower initiation after budding.

3.6 Budding and after care :

Budding on established cuttings (rootstocks) were done on the same date using buds from vigorous growing flowering shoots of the selected cultivars under polyhouse condition. T

method of budding was used. Irrigation was done with the help of mist as well as manual watering. recommended manuring and fertilizer doses were given. Insecticides and fungicides were also used at regular intervals for keeping the plants healthy.

3.7 Selection of cutflowers for Vase life :

Cutflowers selected for studying Vase life were cut with the help of a sharp knife during late afternoon and kept in the refrizrators before placing them in different solutions for study.

3.8 Vase life of the cutflowers :

Vase life of selected cultivars were evaluated using bloom from different treatment combinations. The work was carried out at laboratory of Department of Horticulture.

Following observations were made to assess the Vase life of cutflowers obtaining from different treatment combinations.

3.8.1 Fresh weight of cutflower :

Fresh weight of cutflowers was recorded under the following chemical concentrations.

- (i) 25 ppm Pot. Al. Sul. with 20 mg Sucrose Solution.
- (ii) 50 ppm Pot. Al. Sul. with 20 mg Sucrose Solution.
- (iii) 100 ppm Pot. Al. Sul. with 20 mg Sucrose Solution.
- (iv) Pure Water.

These observations were recorded on the 1st Day, 2nd Day, 4th Day and 6th Day, respectively.

3.8.2 Water uptake of cutflower :

Water uptake of cutflowers was recorded under following chemical concentrations.

- (i) 25 ppm Pot. Al. Sul. with 20 mg Sucrose Solution.
- (ii) 50 ppm Pot. Al. Sul. with 20 mg Sucrose Solution.
- (iii) 100 ppm Pot. Al. Sul. with 20 mg Sucrose Solution.
- (iv) Pure Water.

These observations were recorded on the 2nd Day, 4th Day and 6th Day, respectively.

3.8.3 Vase life of cutflowers :

Vase life of cutflowers were observed by bent necking, dropping of leaves & petals and discolouration of flowers. This observation was also recorded with above mentioned chemical formulations.

EXPERIMENTAL FINDINGS

CHAPTER - IV
EXPERIMENTAL FINDINGS

The results of experiment "Raising of some cutflower roses under polyhouse condition on different rootstocks and effect of Potassium Aluminum Sulphate in prolonging the Vase life of these cutflowers" are described in this following chapter along with appropriate tables.

4.1 RESULTS FOR RAISING OF CUTFLOWER ROSES :

TABLE 2 :

Treatment Combinations	Characters						
	% success of bud take after 15 days of budding	Days to bud sprout after budding	% of bud sprout after budding	No. of leaves on budding after 30 days of budding	No. of branches of budding after 30 days of budding	No. of days to bud emergence after budding	No. of days to first flower initiation
T1	62.50	21.00	57.50	17.00	3.75	26.00	35.00
T2	67.50	18.00	62.50	29.75	7.00	35.50	44.50
T3	60.00	17.75	57.50	31.50	7.25	32.00	41.50
T4	52.50	20.50	50.00	17.75	3.75	42.50	51.50
T5	77.50	16.75	70.00	36.00	8.50	28.25	37.75
T6	65.00	14.50	62.50	41.50	10.00	34.00	43.50
T7	62.50	14.25	62.50	43.00	9.75	31.25	40.25
T8	72.50	14.75	67.50	40.75	9.00	41.50	50.00
T9	55.00	22.25	50.00	14.25	2.75	26.50	35.25
T10	50.00	18.75	50.00	28.00	6.00	33.25	44.25
T11	60.00	19.25	55.00	25.25	6.00	29.75	40.50
T12	57.50	18.25	47.50	28.25	6.25	40.25	51.75
C.D. 5%	8.9	1.7	10.27	6.4	1.6	0.71	0.48
S.E.m _t	3.08	0.59	3.37	2.2	0.54	0.25	0.17

4.1.1. Percentage success of bud take after 15 days of budding :

The results recorded for this attribute are given in Table 2. These results indicated that treatment combinations had significant effect on percentage success of bud take . Treatment combination T5 resulted in highest percentage of bud take after 15 days of budding (77.5%) being at par with T8 (72.5%). Minimum % was recorded for T10 (50%) with T4, T9 and T12 being at par. Other treatment combinations showed significantly higher percentage of bud take than T10.

4.1.2 Days to bud sprout after budding :

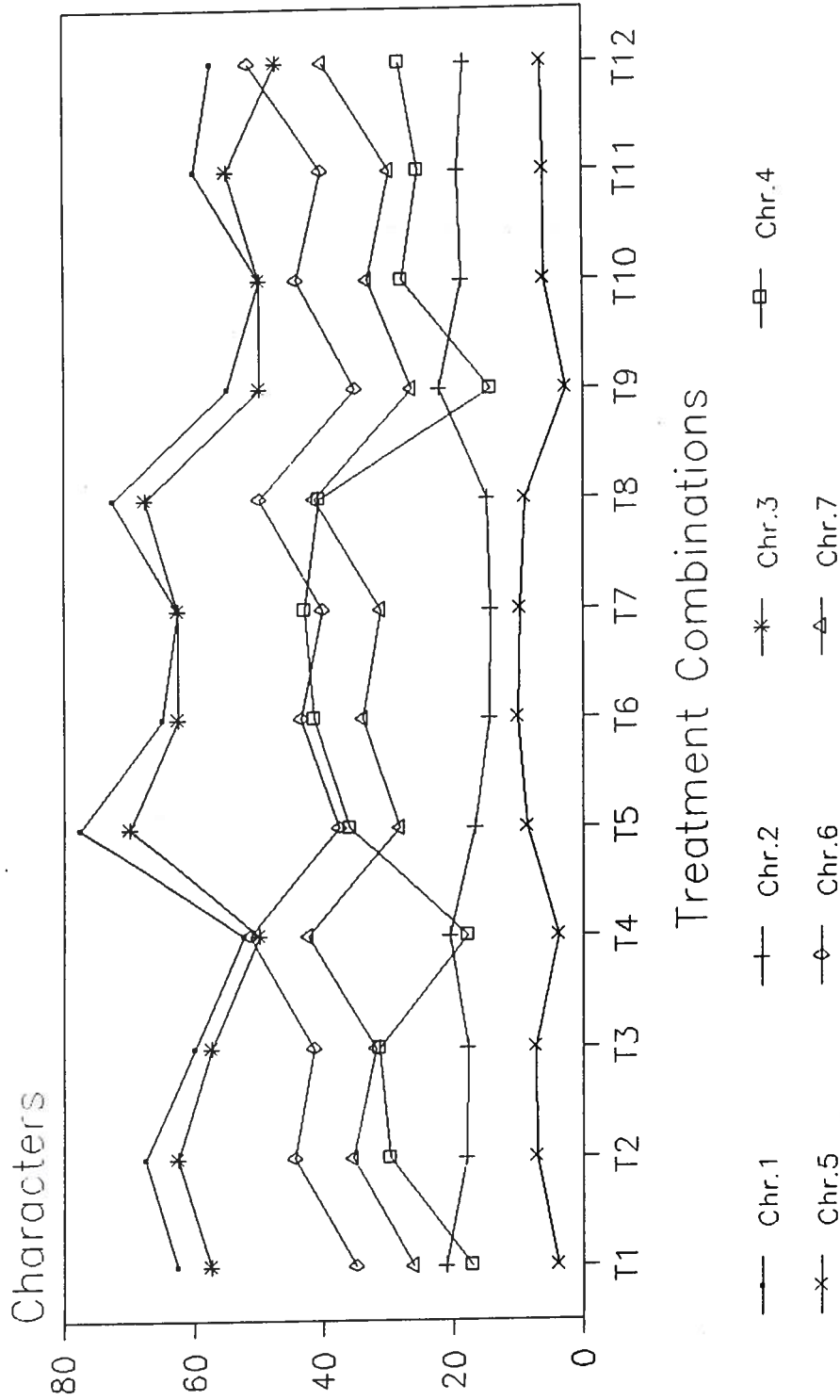
The results recorded for this character are given in Table 2. These results indicated that treatment combinations had significant effect on days to bud sprout. Treatment combination T9 resulted in maximum days to bud sprout (22) being at par with T1. Minimum days to bud sprout was recorded from T7 (14.25) which was at par with T6 & T8. Other treatment combinations had significantly higher days to bud sprout than T7.

4.1.3 Percentage of bud sprout after budding :

It was noticed that treatment combinations had a significant effect on percentage of bud sprout. Treatment combination T5 gave maximum percentage of bud sprout (70%) with T8, T2, T7, T6 being at par, while T12 showed minimum percentage (47.50) with T10, T9, T4, T11, T3 & T1 being at par. Other treatment combinations gave significantly higher % of bud sprout than T12.

[Table 2]

FIG. 3: RESULTS FOR RAISING OF
CUTFLOWER ROSES



Chr. 1 = % success of bud take after 15 days of budding.
 Chr. 2 = % of bud sprout after budding.
 Chr. 3 = No. of branches of budding after 30 days of budding.
 Chr. 4 = No. of days to bud emergence after budding.
 Chr. 5 = % success of bud take after 15 days of budding.
 Chr. 6 = % of bud sprout after budding.
 Chr. 7 = No. of branches of budding after 30 days of budding.

4.1.4 Number of leaves on the budding after 30 days of budding :

The result showed that treatment combinations had significant effect on number of leaves on budding after 30 days of budding.

The result recorded for this attribute are given in Table 2. These results indicated that the maximum number of leaves were recorded for treatment combination T7 (43.0) which was at par with T6 and T8. Minimum number was recorded for T9 (14.28) with T4, T1 being at par, while other treatment combinations gave significantly more number of leaves than T9.

4.1.5 Number of branches of budding after 30 days of budding:

It was recorded that the treatment combinations showed significant effect on number of branches of budding. Treatment combination T6 gave maximum number of branches (10) and T7, T8, T5 were at par. Minimum number of branches was recorded for T9 (2.75) with T4 and T1 being at par while other treatment combinations showed significantly more number of branches after 30 days of budding than T9.

[Table 2]

4.1.6 Number of days to bud emergence after budding :

The results recorded for this attribute are given in Table 2. These results showed significant effect on number of days to bud emergence after budding. Treatment combination T1 took minimum number of days (26) with T9 being at par. Other

treatment combinations showed significantly longer days to bud emergence than T1, while T4 took maximum number of days (42.50) being significantly higher than others.

4.1.7 Number of days to first flower initiation after budding:

The results indicated that treatment combinations had significant effect on number of days to first flower initiation after budding. Treatment combination T1 took minimum number of days to flower initiation (35) with T9 being at par. Other treatment combinations showed significantly longer days to flower initiation than T1, while T4 took maximum numbers of days (51.75) being was at par with T12.

[Table 2]

4.2 RESULTS FOR PROLONGING VASE LIFE OF CUTFLOWERS :

"20 mg sucrose was added in each chemical concentration except pure water".

4.2.1 Effect of Potassium Aluminum Sulphate on the fresh weight (in gms) of cut rose at concentration of 25 ppm:

The results recorded for this attributes are given in Table 3. These results showed that treatment combinations had significant effect on fresh weight of cut rose.

First day : Treatment combination T4 showed maximum weight of 4.41 gm and gave non-significant effect with T5, T9 and T12. T10 had minimum fresh weight of 3.10 gm and gave non-significant effect with T11, T2 and T6, while other treatment

20

combinations showed significantly greater fresh weight than T10.

Table 3 : Fresh weight of cutflowers (in gms) at concentration of 25 ppm Potassium Aluminium Sulphate with 20 mg sucrose solution.

Treatment Combinations	1st Day	2nd Day	4th Day	6th Day
T1	3.79	6.18	7.70	2.31
T2	3.39	5.74	7.29	1.89
T3	3.84	6.20	7.72	2.40
T4	4.41	6.78	8.30	3.02
T5	4.15	6.28	7.75	2.50
T6	3.50	5.84	7.31	1.92
T7	3.51	5.87	7.36	1.96
T8	3.98	6.34	7.85	2.56
T9	4.05	6.38	7.89	2.73
T10	3.10	5.37	6.90	1.45
T11	3.21	5.56	7.34	1.99
T12	4.02	6.38	7.92	2.66
C.D. 5%	0.4	0.4	0.4	0.5
S.Em±	0.13	0.15	0.15	0.17

Second day : Treatment combination T4 gave maximum weight of 6.78 gm and was at par with T9 and T12. T10 gave minimum fresh weight of 5.37 and was at par with T11 and T2, while other treatment combinations gave significantly greater fresh weight than T10.

Fourth day : T4 had maximum weight of 8.30 gm and gave non-significant effect with T12. Treatment combination T10 gave minimum value of 6.90 gm and was at par with T2 having higher significant weight than other treatment combinations.

Sixth day : Results indicated that the higher fresh weight of cutflower was recorded for treatment combination T4 (3.02 gm) which was at par with T9, T12, T8. Minimum fresh weight was recorded for T10 (1.45 gm) with T6, T2 being at par. Other treatment combinations gave significantly greater fresh weight than T10.

4.2.2 Effect of Potassium Aluminum Sulphate on fresh weight (in gms) of cut rose at concentration of 50 ppm. :

It was observed that treatment combinations had significant effect on fresh weight of cut rose.

First day : Treatment combination T9 showed maximum fresh weight of 5.53 gm which was significantly higher than other treatment combinations, while T6 showed minimum fresh weight of 3.43 gm. Which was at par with T4. Other treatment combinations showed significantly greater fresh weight than T6.

Second day : T9 gave maximum value of 7.88 gm which was significantly higher than others. T6 gave minimum value of 5.74 gm and was at par with T4. Rest of the treatment combinations gave significantly more values than T6.

Table 4 : Fresh weight of cutflowers (in gms) at concentration of 50 ppm Potassium Aluminium Sulphate with 20 mg sucrose solution.

Treatment Combinations	1st Day	2nd Day	4th Day	6th Day
T1	4.33	6.66	8.43	3.23
T2	4.04	6.37	8.14	2.83
T3	4.23	6.56	8.28	3.06
T4	3.67	5.99	7.72	2.43
T5	4.84	7.15	8.92	3.77
T6	3.43	5.72	7.44	2.04
T7	4.85	7.24	8.85	3.57
T8	4.11	6.42	8.17	2.91
T9	5.53	7.88	9.63	4.46
T10	4.83	7.13	8.86	3.68
T11	4.29	6.65	8.36	3.14
T12	4.28	6.67	8.37	2.71
C.D. 5%	0.4	0.4	0.4	0.6
S.Em±	0.12	0.14	0.15	0.21

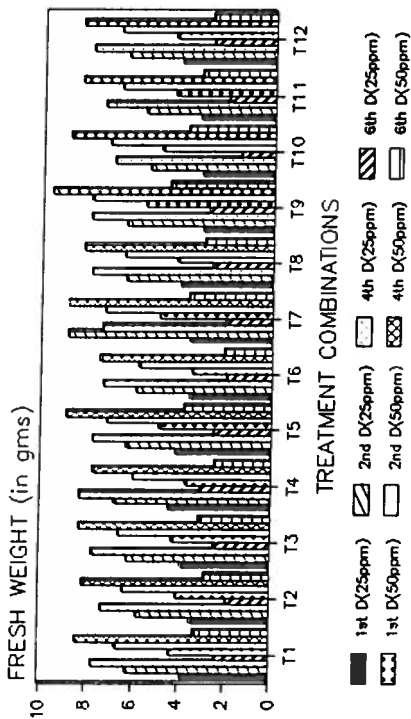
Fourth day : T9 again gave maximum value (9.6 gm), was significantly higher than other treatment combinations. Minimum value was recorded by T6 (7.74), which was at par with T4 and all other treatment combinations being significantly higher than T6.

Sixth day : Results indicated that the highest fresh weight of cutflower was recorded for treatment combination T9 (4.46 gm) which was significantly higher than other treatment

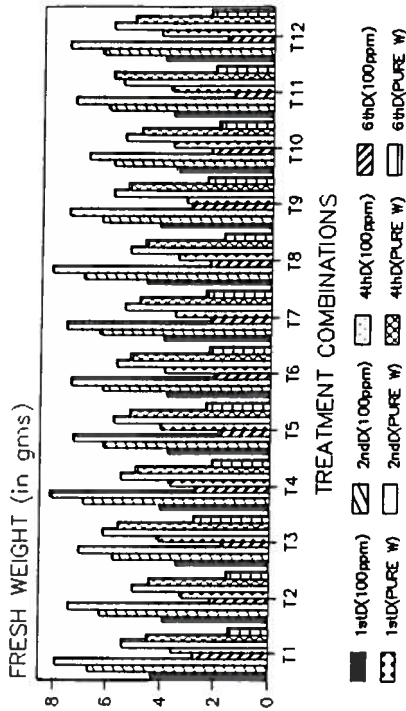
FIG.4: FRESH WEIGHT OF CUTFLOWERS IN DIFFERENT

CHEMICAL CONCENTRATIONS

FRESH WEIGHT OF CUTFLOWERS (in gms) AT
 CONC. OF 25 & 50 ppm Pot.AI.Sul.
 WITH 20 mg. SUCROSE SOLUTION



FRESH WEIGHT OF CUTFLOWERS (in gms) AT
 CONC. OF 100 ppm Pot.AI.Sul.(WITH 20 mg.
 SUCROSE SOLUTION) AND PURE WATER



combinations. Minimum fresh weight was recorded for T6 (2.04 gm) with T4 being at par and rest of all treatment combinations showed significantly higher fresh weight than T8.

[Table 4]

4.2.3 Effect of Potassium Aluminum Sulphate on fresh weight (in gms) of cut rose at concentration of 100 ppm. :

The result recorded for this character are given in Table 5. These results indicated that treatment combinations had significant effect on fresh weight of cut rose.

Table 5 : Fresh weight of cutflowers (in gms) at concentration of 100 ppm Potassium Aluminium Sulphate with 20 mg sucrose solution.

Treatment Combinations	1st Day	2nd Day	4th Day	6th Day
T1	4.34	6.66	7.93	2.75
T2	3.90	6.26	7.43	2.15
T3	3.41	5.80	7.06	1.71
T4	4.03	6.93	8.11	2.73
T5	3.75	6.15	7.28	1.85
T6	3.80	6.20	7.39	2.05
T7	3.94	6.32	7.56	2.22
T8	4.60	6.96	8.13	2.24
T9	4.14	6.30	7.53	2.97
T10	3.50	5.86	6.81	2.24
T11	3.66	6.09	7.33	1.42
T12	3.98	6.32	7.56	1.70
C.D. 5%	0.4	0.5	0.5	0.6
S.Em±	0.15	0.17	0.17	0.20

First day : Treatment combination T8 showed maximum fresh weight (4.60 gm) and was at par with T1. Minimum weight was recorded by T3 (3.41 gm) which was at par with T10, T11 and T5, while other treatment combinations gave significantly higher fresh weight than T3.

Second day : Treatment combination T8 gave maximum weight (6.96 gm) and was at par with T4 & T1. Minimum weight was recorded by T3 (5.80 gm) which was at par with T10, T11, T5 & T6, while other treatment combinations gave significantly higher fresh weight than T3.

Fourth day : The highest fresh weight of cutflower was recorded for treatment combination T8 (8.13 gm) which was at par with T4. Minimum fresh weight was recorded by T10 (6.81 gm) with T3 & T5 being at par. Other treatment combinations gave significantly higher fresh weight than T10.

Sixth day : T9 had maximum weight of 2.97 gm which was at par with T1 and T4. T11 showed minimum value of 1.42 gm which was at par with T12, T3, T5 and was significantly lower than rest of the treatment combinations.

4.2.4 Effect of pure water on fresh weight (in gms) of cut rose :

Results indicated that treatment combinations showed non-significant effect on fresh weight of cut rose. The maximum and minimum values are given below.

1st Day - T8 gave maximum value of 3.42 gm than minimum value of T2 (3.22 gm).

Table 6 : Fresh weight of cutflowers on pure water (in gms).

Treatment Combinations	1st Day	2nd Day	4th Day	6th Day
T1	3.56	5.40	4.45	1.43
T2	3.22	5.01	4.41	1.55
T3	4.11	6.15	5.58	2.78
T4	3.69	5.49	4.91	2.10
T5	4.04	5.80	5.17	2.34
T6	3.88	5.68	5.15	2.26
T7	3.54	5.42	4.85	2.37
T8	3.42	5.22	4.63	1.75
T9	4.13	5.88	5.29	2.39
T10	3.66	5.44	4.84	1.94
T11	3.73	5.53	4.94	2.12
T12	4.14	5.94	5.13	2.29
C.D. 5%	NS	NS	NS	NS
S. Em±	-	-	-	-

2nd Day - T3 gave maximum value of 6.15 gm than minimum value of T2 (5.01 gm).

4th Day - T3 gave maximum value of 5.58 gm than minimum value of T2 (4.41 gm).

6th Day - T3 gave maximum value of 2.78 gm than minimum value of T2 (1.43 gm).

[Table 6]

4.2.5 Effect of Potassium Aluminum Sulphate on the water uptake of cut rose (in ml.) at conc. of 25 ppm.:

Results indicated that treatment combinations had non-significant effect on flower water uptake. The maximum and minimum values are given below.

Table 7 : Water uptake of cutflowers (in ml.) at concentration of 25 ppm Potassium Aluminium Sulphate with 20 mg sucrose solution.

Treatment Combinations	2nd Day	4th Day	6th Day
T1	3.25	2.50	1.50
T2	3.50	2.25	1.50
T3	3.75	2.50	1.50
T4	3.00	2.25	1.25
T5	3.75	3.25	1.75
T6	3.50	2.50	1.25
T7	3.25	2.00	1.25
T8	3.25	2.25	1.25
T9	3.25	2.75	1.75
T10	2.75	2.75	1.25
T11	3.25	2.50	1.50
T12	3.50	2.75	1.00
C.D. 5%	NS	NS	NS
S.Em±	-	-	-

2nd Day - T3 and T5 gave maximum values of 3.75 ml than minimum value of T10 (2.75 ml).

4th Day - T5 had maximum value of 3.25 ml than minimum of T7 (2.00 ml).

6th Day - T5 & T9 showed maximum value of 1.75 ml than minimum value of T12 (1.0 ml). [Table 7]

4.2.6 Effect of Potassium Aluminum Sulphate on the water uptake of cut rose (in ml.) at conc. of 50 ppm.:

It was noted that treatment combinations gave non-significant effect on water uptake. The maximum and minimum values are given below.

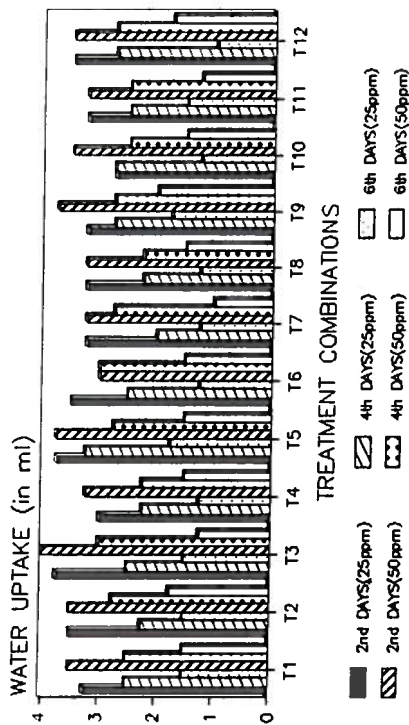
Table 8 : Water uptake of cutflowers (in ml.) at concentration of 50 ppm Potassium Aluminium Sulphate with 20 mg sucrose solution.

Treatment Combinations	2nd Day	4th Day	6th Day
T1	3.50	2.50	1.50
T2	3.50	2.75	1.75
T3	4.00	3.00	1.25
T4	3.25	2.25	1.50
T5	3.75	2.75	1.50
T6	3.00	3.00	1.50
T7	3.25	2.75	1.00
T8	3.25	2.25	1.50
T9	3.75	2.75	2.00
T10	3.50	2.50	1.50
T11	3.25	2.50	1.25
T12	3.50	2.75	1.75
C.D. 5%	NS	NS	NS
S. Em±	-	-	-

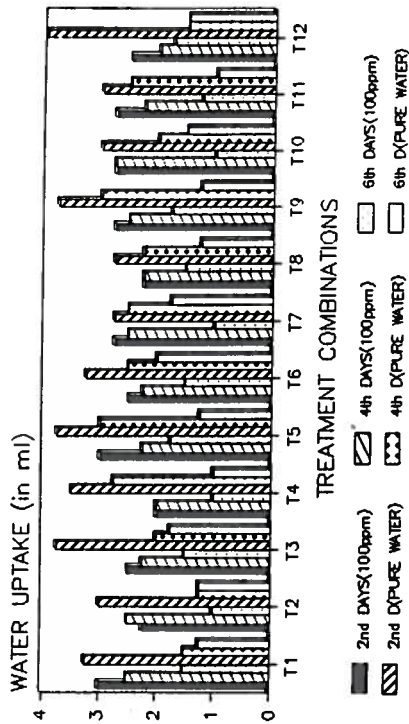
FIG.5: WATER UPTAKE OF CUTFLOWERS IN DIFFERENT

CHEMICAL CONCENTRATIONS

WATER UPTAKE OF CUTFLOWERS (in ml) AT
 CONC. OF 25 & 50 ppm Pot.Al.Sul.
 WITH 20 mg. SUCROSE SOLUTION



WATER UPTAKE OF CUTFLOWERS (in ml) AT
 CONC. OF 100 ppm Pot.Al.Sul.(WITH 20 mg.
 SUCROSE SOLUTION) AND PURE WATER



- 2nd Day - T3 had maximum value of 4 ml than minimum value of T6 (3 ml.).
- 4th Day - T3 & T6 showed maximum value of 3 ml. than minimum value of T7 (1.0 ml).
- 6th Day - T9 had maximum value of 2 ml. than minimum value of T7 (1.0 ml). [Table 8]

4.2.7 Effect of Potassium Aluminum Sulphate on the water uptake of cut rose (in ml.) at conc. of 100 ppm.:

It was observed that treatment combinations showed non-significant effect on water uptake. The maximum and minimum values are given below.

Table 9 : Water uptake of cutflowers (in ml.) at concentration of 100 ppm Potassium Aluminium Sulphate with 20 mg sucrose solution.

Treatment Combinations	2nd Day	4th Day	6th Day
T1	3.00	2.50	1.50
T2	2.25	2.50	1.00
T3	2.50	2.25	1.50
T4	2.00	2.00	1.00
T5	3.00	2.25	1.75
T6	2.50	2.25	1.50
T7	2.75	2.50	1.00
T8	2.25	2.25	1.50
T9	2.75	2.50	1.75
T10	2.75	2.75	1.00
T11	2.75	2.25	1.25
T12	2.50	2.00	1.75
C.D. 5%	NS	NS	NS
S. Em±	-	-	-

2nd Day - T1 & T5 showed maximum value of 3 ml than minimum value of T4 (2.0 ml).
 4th Day - T10 had maximum value 2.75 ml than minimum value of T4 & T12 (2.0 ml).
 6th Day - T5, T9 & T12 showed maximum value of 1.75 ml and T2, T4, T7 and T10 showed minimum value of 1 ml. [Table 9]

4.2.8 Effect of pure water on the water uptake of cut rose (in ml.):

It was observed that non-significant effect showed by treatment combinations on water uptake. The maximum and minimum values are given below.

Table 10 : Water uptake of cutflowers (in ml.) on pure water.

Treatment Combinations	2nd Day	4th Day	6th Day
T1	3.25	1.50	1.25
T2	3.00	1.25	1.25
T3	3.75	2.00	1.75
T4	3.50	2.75	1.00
T5	3.75	3.00	1.25
T6	3.25	2.50	2.00
T7	2.75	2.50	1.75
T8	2.75	2.25	1.25
T9	3.75	3.00	1.25
T10	3.00	2.00	1.50
T11	3.00	2.50	1.00
T12	4.00	1.50	1.50
C.D. 5%	NS	NS	NS
S. Em±	-	-	-

- 2nd Day - T12 had maximum value of 4 ml than minimum value of T7 & T8 (1.25 ml).
- 4th Day - T5 & T9 showed maximum of 3 ml than minimum value of T2 (1.25 ml).
- 6th Day - T6 had maximum value of 3 ml than minimum value of T4 & T11 (1.0 ml). [Table 10]

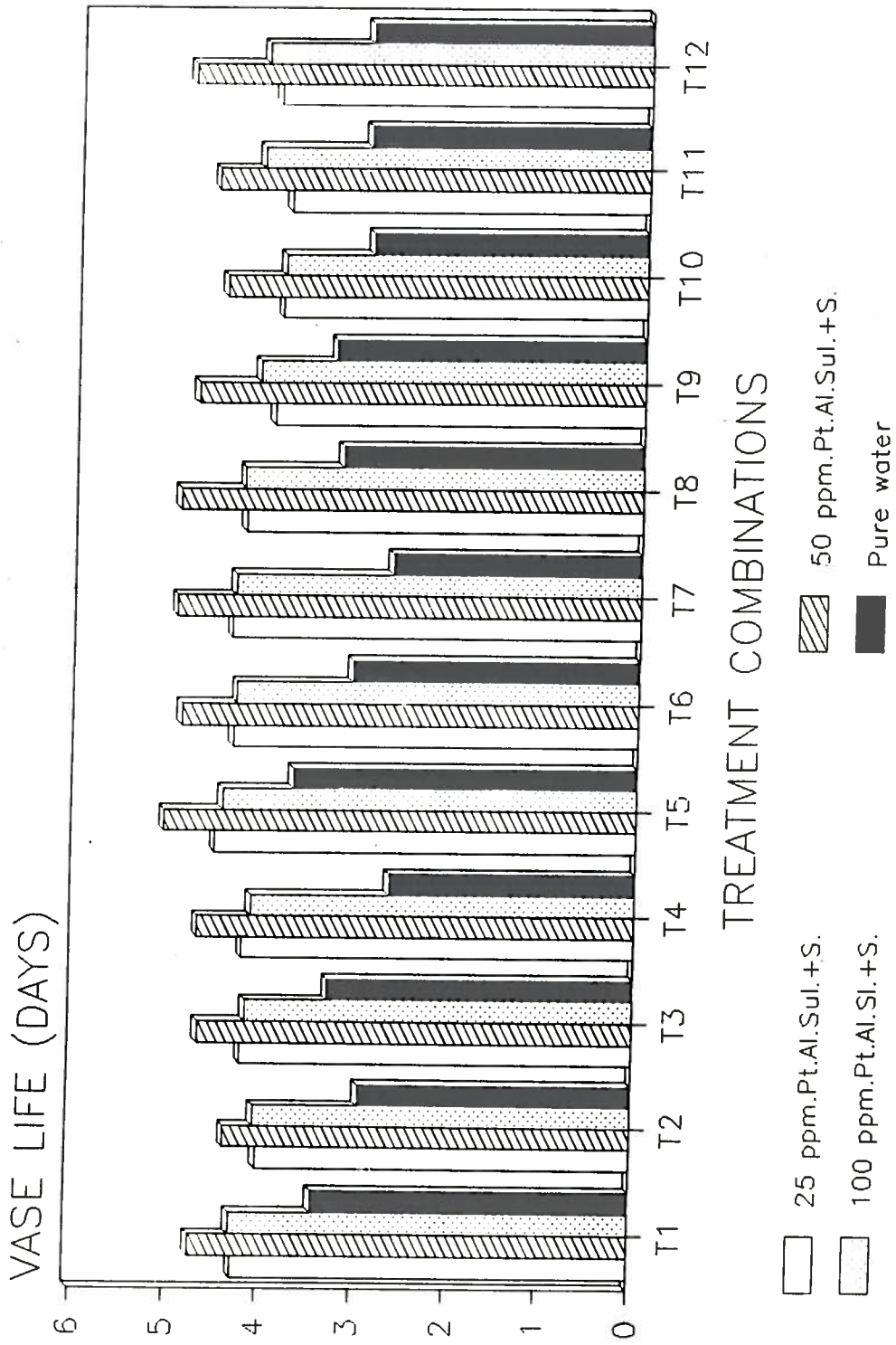
4.2.9 Effect of Potassium Aluminum Sulphate on the Vase life of cut roses (in days) at concentration of 25 ppm. :

It was noticed that treatment combinations showed significant effect on Vase life.

Table 11 : Vase life of cutflowers (in days).

Treatment Combinations	25 ppm	50 ppm	100 ppm	Pure water
	Pot.Al.Sul. + 20 mg Suc.	Pot.Al.Sul. + 20 mg Suc.	Pot.Al.Sul. + 20 mg Suc.	
T1	4.27	4.73	4.30	3.43
T2	4.03	4.38	4.07	2.95
T3	4.22	4.68	4.18	3.30
T4	4.22	4.70	4.13	2.65
T5	4.53	5.07	4.45	3.70
T6	4.35	4.90	4.32	3.08
T7	4.38	4.97	4.35	2.68
T8	4.25	4.95	4.27	3.23
T9	3.97	4.78	4.13	3.32
T10	3.90	4.50	3.88	2.95
T11	3.83	4.60	4.13	3.00
T12	3.97	4.88	4.10	3.00
C.D. 5%	0.30	0.30	0.25	NS
S.Em±	0.09	0.09	0.09	-

FIG.6: VASE LIFE OF CUTFLOWERS (IN DAYS)



The results recorded for this character are given in Table 11. These results indicated that highest Vase life of cut rose was recorded for treatment combination T5 (4.53 days) which was at par with T1, T6, T7 and T8. Minimum Vase life was recorded for T11 (3.83 days) with T10, T12, T9 and T2 being at par. Other treatment combinations showed significant higher Vase life than T11.

4.2.10 Effect of Potassium Aluminum Sulphate on the Vase life of cut roses (in days) at conc. of 50 ppm.:

It was found that treatment combinations showed significant effect on Vase life of cut roses. The results recorded for this attribute are given in Table 11. These results indicated that the maximum Vase life of cut roses was recorded for the treatment combination T5 (5.07 days) which was at par with T7, T8, T6, T12 and T9. The minimum Vase life was recorded for T2 (4.38 days) with T10, T11 & T3 being at par. Other treatment combinations gave significantly higher Vase life than T2.

4.2.11 Effect of Potassium Aluminum Sulphate on the Vase life of cut roses (in days) at conc. of 100 ppm. :

It was recorded that treatment combinations showed significant effect on Vase life of cutflower. The results indicated that treatment combination T5 showed maximum Vase life of 4.35 days which is at par with T7, T6, T1 and T8, while T10 gave minimum values of 3.88 days which was at par with T2, T12, T11, T9 and other treatment combinations gave significantly higher values than T10. [Table 11]

4.2.12 Effect of Pure water on Vase life of cut roses (in days) :

Results indicated that treatment combination showed non-significant effect on Vase life. Treatment combination T5 showed highest Vase life of 3.70 days and T4 gave minimum value of 2.65 days. [Table 11]

DISCUSSION

CHAPTER - V

DISCUSSION

The investigation entitled, "Raising of some cutflower roses under polyhouse condition on different rootstocks and effect of Potassium Aluminium Sulphate in prolonging the Vase life of these cutflowers", is discussed and interpreted in the following characters in the light of results obtained and past work done on similar studies by other workers.

5.1 Percentage success of bud take after 15 days of budding :

Results for percentage success of bud take after 15 days indicated significant effect of different treatment combinations included in this study. T5 gave the highest percentage of bud take (77.5) which is in conformity with those Pal (66), Singh (72-74), Pandey and Sharma (76), Singh (80), Mukhopadhyay (82), Lal and Seth (84), Chadda (86), Kaicher and Dhayani (86), Chandramohan and kaicher (90), Sen (90) and Gowda (92). These workers observed that *Rosa multiflora* is a better rootstock than others for budding of scions of various cultivars.

Consistently good performance of *Rosa multiflora* for percentage success of bud take may also be attributed due to its ideal characteristics of a thick bark which separate easily from woody tissue and at the same time has a lot more cell sap flowing due to its inherent nature of vigorous vegetative growth.

Although the percentage success obtained was higher than other yet it was not high as 100% reported by Pandey and Sharma (76), this may be due to the high soil and air temperature within the polyhouse (May be because of power cut during period of experiment).

5.2 Days to bud sprout after budding :

Treatment combinations had a significant effect on days to bud sprout. Treatment combination T7 took minimum days to bud sprout (14.25) which is similar to the results obtained by Pandey and Sharma (76). They found that *Rosa multiflora* was superior over other rootstocks in respect to days to bud sprout after budding.

Vigorous vegetative growth of *Rosa multiflora* may be a contributing factor towards this attribute.

5.3 Percentage of bud sprout after budding :

Results for percentage of bud sprout after budding indicated significant effect of the treatment combinations. Here treatment combination T5 showed highest percentage of bud sprout (70%) than the other treatment combinations.

5.4 Number of leaves on the budding after 30 days of budding :

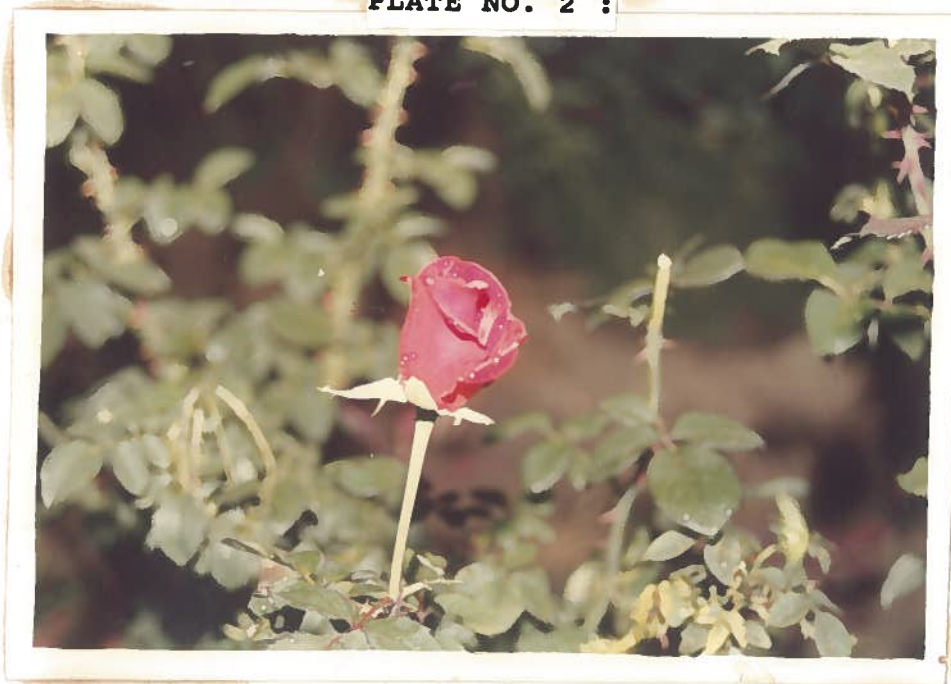
Results for number of leaves on the budding after 30 days of budding indicated that T7 had maximum number of leaves (43) and T9 had minimum number of leaves. Results tally with those obtained by Mattos and Ferrante (71), Pandey

PLATE NO. 1 :



BUDDING OF VARIOUS ROOTSTOCK UNDER
POLYHOUSE

PLATE NO. 2 :



CV. KARDINAL

and Sharma (79), Singh (80), Chandramohan and Kaicher (90). These workers found that *Rosa multiflora* was better for obtaining good vigour on them due the robust growth habit of the rootstock.

5.5 Number of branches of the budding after 30 days of budding :

Treatment combinations had significant effect on number of branches of the budding. Treatment combination T6 gave maximum number of branches (10) and T9 gave minimum number of branches (2.75) as with other attributes, faster growth of *Rosa multiflora* also seems to have a bearing on the numbers.

5.6 Number of days to bud emergence after budding :

From table 2 we can say that treatment combination T1 took minimum number of days to bud emergence (26) after budding.

5.7 Number of days to first flower initiation after budding :

Treatment combination T1 which gave a significant response for earlier bud emergence, also took minimum number of days for flower initiation (35).

5.8 Effect of Potassium Aluminium Sulphate on the fresh weight (in gms) of cut rose at concentration of 25 ppm with 20 mg Sucrose Solution :

The results showed that treatment combination T4 gave maximum fresh weight during entire length of observation on 1st day, 2nd day, 4th day and 6th day. This result may be

attributed to the efficiency of treatment combination T4 to maintaining fresh weight at concentration of 25 ppm Potassium Aluminium Sulphate.

5.9 Effect of Potassium Aluminium Sulphate on the fresh weight (in gms) of cut rose at concentration of 50 ppm with 20 mg. Sucrose Solution :

The results showed that T9 gave maximum fresh weight during course of observation [1st day, 2nd day, 4th day and 6th day]. This results may be attributed to the efficiency of treatment combination T9 for maintaining fresh weight at concentration of 50 ppm Potassium Aluminium Sulphate.

5.10 Effect of Potassium Aluminium Sulphate on fresh weight (in gms) of cut rose at concentration of 100 ppm. with 20 mg Sucrose Solution :

Observation for fresh weight at concentration of 100 ppm showed varying degree of effect on fresh weight on different treatment combinations. Treatment combination T8 showed greater fresh weight on 1st day, 2nd day and 4th day while treatment combination T6 showed higher fresh weight on day 6th. These variation may be due to the varying capacity of different treatment combinations to transpire or loose moisture at different rates resulting in this variation or differences.



PLATE NO. 3 : CV. SYLVIA



PLATE NO. 4 : CV. GOLD MEDAL



PLATE NO. 5 : CV. WHITE SUCCESS

5.11 Effect of Potassium Aluminium Sulphate on the Vase life (in days) at concentration of 25 ppm with 20 mg Sucrose Solution :

The results indicated that treatment combinations had significant effect on Vase life of cut rose. Table 11 showed that treatment combination T5 had maximum Vase life of 4.53 days.

5.12 Effect of Potassium Aluminium Sulphate on the Vase life (in days) at concentration of 50 ppm with 20 mg Sucrose Solution :

Treatment combination T5 showed maximum Vase life (5.07 days). These results are in close proximity with the findings of Naik (89) and Mohanty (93). They also observed the highest Vase life of rose in 50 ppm Potassium Aluminium Sulphate with 20 mg Sucrose Solution.

5.13 Effect of Potassium Aluminium Sulphate on the Vase life of cut rose (in days) at concentration of 100 ppm with 20 mg Sucrose Solution :

Again T5 showed maximum Vase life of cut rose at above mentioned chemical formulation.

It seems that treatment combination T5 was the last to be affected by bentneck which is primarily caused by loss of turgidity brought by failure of stem to take up sufficient water or by excessive evaporation from the foliage or by the combination by two. Further it is obvious that a concentration of 50 ppm Potassium Aluminium Sulphate in 20 mg Sucrose Solution is optimum for increasing the Vase life.

5.14 Following characters showed non-significant effect :

Varying treatment combinations tested in the study did not differ significantly from each other for, three traits that is, effect of pure water on fresh weight, effect of water uptake recorded at 2nd, 4th and 6th day with different chemical concentrations and effect of pure water of Vase life.

**SUMMARY, CONCLUSIONS AND
SUGGESTIONS FOR FUTURE WORK**

CHAPTER - VI

SUMMARY, CONCLUSION AND SUGGESTIONS FOR FUTURE WORK

The present study, " Raising of some cutflower roses under polyhouse condition on different rootstocks and the effect of Potassium Aluminium Sulphate in prolonging the Vase life of these cutflowers" was carried out in the polyhouse situated in the ornamental nursery, Department of Horticulture, I.G.A.U., Raipur, during the year 1996. The main objectives were -

- (I) To evaluate the different rootstock-scion combinations for budding purpose under polyhouse condition.
- (II) To evaluate the suitability of these combinations for cutflower production under polyhouse condition.
- (III) To study the influence of the Potassium Aluminium Sulphate with Sucrose Solution for prolonging the Vase life of these cultivars.

The findings of this study are summarized as follows :

6.1 Raising of cutflowers :

- 6.1.1 Treatment combination T5 (*Rosa multiflora* x Kardinal) showed the highest percentage (77.5) of bud take .
- 6.1.2 Treatment combination T₇ (*Rosa multiflora* x Gold Medal) took minimum days (14.25) to bud sprout.
- 6.1.3 Treatment combination T5 (*Rosa multiflora* x Kardinal) also gave maximum percentage (70%) of bud sprout.
- 6.1.4 T7 (*Rosa multiflora* x Gold Medal) recorded the maximum number of leaves (43), and

6.1.5 T6 (*Rosa multiflora* x *Sylvia*) showed maximum number of branches (10).

6.1.6 Minimum number of days for bud emergence and flower initiation was found under Treatment combination T1 (*Rosa bourboniana* x *Kardinal*).

6.2 Assessment of Vase life :

6.2.1 Maximum fresh weight of the treatment combinations recorded under different concentrations of Potassium Aluminium Sulphate with 20 mg Sucrose Solution were -

(i) T4 (*Rosa bourboniana* x *White Success*) in 25 ppm on 4th day.

(ii) T9 (*Rosa indica* x *Kardinal*) in 50 ppm on 4th day.

(iii) T8 (*Rosa multiflora* x *White Success*) in 100 ppm on 4th day.

6.2.2 Maximum Vase life for T5 (*Rosa multiflora* x *Kardinal*) recorded under different concentrations of Potassium Aluminium Sulphate with 20 mg Sucrose Solution were -

(i) 4.53 days under 25 ppm Pot. Al. Sul. with 20 mg Sucrose Solution.

(ii) 5.07 days under 50 ppm Pot. Al. Sul. with 20 mg Sucrose Solution.

(iii) 4.35 days under 100 ppm Pot. Al. Sul. with 20 mg Sucrose Solution.

CONCLUSION

On the basis of results obtained from the present investigations following conclusion are drawn :-

- (i) Rootstock *Rosa multiflora* and cultivar 'Kardinal' were most suitable for obtaining the highest per cent of bud take and maximum bud sprout percentage.
- (ii) *Rosa multiflora* and scion cv. 'Gold Medal' produced maximum number of leaves.
- (iii) *Rosa multiflora* and scion cv. 'Sylvia' produced maximum number of branches.
- (iv) Minimum number of days to bud sprout were recorded by a combination of *Rosa multiflora* budded with cv. 'Gold Medal'
- (v) *Rosa bourboniana* with 'Kardinal' was found best for early bud emergence and flower initiation.
- (vi) *Rosa multiflora* with 'Kardinal' yields flowers, having the maximum Vase life with 50 ppm concentration of Potassium Aluminium Sulphate with 20 mg Sucrose Solution.

At last it can be said that *Rosa multiflora* was found best rootstock with cultivar 'Kardinal' as scion under polyhouse condition for budding purpose as well as production of cutflowers having longer Vase life.

SUGGESTIONS FOR FUTURE WORK

Following suggestions are made for undertaking future line of work on the basis of the results obtained under this study.

- (I) More number of rootstocks may be evaluated to assess optimum rootstock performance.
- (II) Similarly a greater number of cutflower varieties may be assessed to conclude the optimum cultivar for cutflower purpose.
- (III) A comparison may also be made of the different rootstock-scion combinations under polyhouse as well as open field conditions.
- (IV) A study on utility of polyhouse to produce cutflowers for **PROLONGED PERIOD** can also be taken up.
- (V) As for Vase life, other chemicals viz. AgNO_3 , NiSO_4 , CoCl_2 , $\text{Al}_2(\text{SO}_4)_3$, 8HQ, CoSO_4 , citric acid can be compared with 50 ppm of $\text{KAl}_2(\text{SO}_4)_3$ obtained under this experiment.

ABSTRACT

**RAISING OF CUTFLOWER ROSES UNDER POLYHOUSE CONDITION
ON DIFFERENT ROOTSTOCKS AND EFFECT OF POTASSIUM
ALUMINIUM SULPHATE [KAl₂(SO₄)₃] IN PROLONGING
THE VASE LIFE OF THESE CUTFLOWERS**

By

ANIL KUMAR SINGH CHAUHAN

ABSTRACT

An experiment was conducted during July - Nov. 1996 in the polyhouse & laboratory of the Department of Horticulture, I.G.A.U., Raipur (M.P.).

The major objectives were -

- (i) To evaluate the different rootstock-scion combinations for budding purpose under polyhouse condition.
- (ii) To evaluate the suitability of these combinations for cutflower production under polyhouse condition.
- (iii) To study the influence of the Potassium Aluminium Sulphate with Sucrose Solution for prolonging the Vase life of these cultivars.

Rose cutflowers are rapidly gaining prominence as major foreign exchange earners. Chhattisgarh region especially Raipur, is ideally suited for its production with good potential waiting to be exploited.

This experiment was conducted to explore the possibility of utilizing polyhouse for this purpose.

The important findings of this experiment are amongst the rootstocks and cultivars studied, the rootstock *Rosa multiflora* and cultivar 'Kardinal' were found best for cutflower purpose under polyhouse condition.

Vase life was significantly prolonged by this treatment combination that is 'Kardinal' budded on *Rosa multiflora* at 50 ppm concentration of Potassium Aluminium Sulphate with 20 mg Sucrose Solution.

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