Egypt. J. Agric. Res. , 71 (2), 1993.

THE EFFECT OF WOUNDING AND IBA CONCENTRATION ON ROOTING OF MM 106 APPLE ROOTSTOCK

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(Manuscript received 6 October 1990)

Abstract

This study was carried out to investigate the effect of wounding by different methods, wounding : base of cuttings, split cut at base of cutting and longitudinal cut at the base of cuttuings on rooting of MM 106 cuttings.

Cuttings were also treated by 0, 1000, 2000 and 3000 ppm IBA concentration.

This effect was more obvious due to wounding + 2000 ppm IBA at the first season. Highest percent of rooting was recorded (86.66 %), number of roots (4.00) and total root growth of roots (16 .80 cm). In the second season, split cut at base of cuttings + 2000 ppm IBA caused an increase in rooting percent (86.66 %),

INTRODUCTION

Different wounding methods were tried for increasing root production in several plant species. In some of plant species, root production on stem cuttings may be promoted by wounding the base of the cutting. A vertical cut with the tip of a sharp knife down each side of the cutting for one inch or two, penetrating through the bark and into the wood may be enough.

Greenhouse storage treatments for two months, resulted in the best rooting

percentages in January, with wounded tip and medium cuttings of "Le Conte" pear (Fouad 1965). Howard (1968). indicated that wounding between nodes of both plum and apple cuttings enhanced rooting percentages comparable to those obtained disbudding.

Wounded cells near the base of the cutting, are stimulated into cell division and production of root primordial . This is due to a natural accumulaton of hormones and carbohydrates in the wounded area and to an increase in respiration (Hartmann and Kester 1972).

Hardwood cuttings of "Baladi" apple prepared from mature shoots failed to initiate any adventitious roots even when treated with different root inducers. Cutting prepared from Juvenile shoots struck adventitious roots and survived successfully . Terminal juvenile cuttings treated with wounding and soaking in 300 ppm IBA, resulted in a highest percentage of success (El-Tomi *et at.* 1974).

Wounding responses in winter cuttings of M 26 were studied by (Haward *et al.*, 1979). Cuttings were prepared from stool shoots, with the already rooted portion removed, or from a hedge, in both cases either cut at basal node or an internode. Wounds of 2cm long, were made at the bases of cuttings. Wounding increased rooting slightly and almost all cuttings had roots associated with wounds. The rooting level after wounding was almost identical with the deep wound.

The application of an antidesiccant to the wounds caused by disbudding greatly influenced root formation, as did the humidity of the rooting environment . Moisture changes in the cuttings before root emergence were caused by disbudding without antidesiccant treatement or a humid atmosphere, and were associated with reduced rooting. In plum moisture loss caused failure to root, whereas in apple a slight incresase in moisture content had a similar effect (Howard 1980).

Hardwood cuttings of *Pyrus communis* each with 4 - 6 buds taken in January or February from root suckers of pear trees, and treated with IBA at 200 ppm, showed higher rooting percentage (Ibrahim *et al.*, 1976).

This study was carried out to study the effect of different wounding methods and different concentrations of IBA for increasing root production.

MATERIALS AND METHODS

In season 1986, wounding was carried out in basal portion of MM 106 cuttings, and treated with IBA at concetrations: 0, 1000 , 2000 and 3000 ppm. Cuttings were planted in media composed of Peatmoss + Sand (1 : 1) by volume in plastic boxes, and left after rooting for one week, for hardening. Then rooted cuttings were planted in plastic bags.

In 1987, wounding was done in different ways :

Wounding base of cuttings, split cut at base of cutting, and longitudinal cut at base of cuttings. After wounding, they were treated with IBA mixed with pesticide (Vetavax capetan) and planted in media composed of Peatmoss + Sand (1: 1 by volume) in plastic boxes. Cuttings were left after rooting for a month for hardening and then planted in plastic bags (half gallon by volume). Data were recorded on percentage of rooting cuttings, number of roots per cutting and total root growth per cutting.

The statistical analysis of the data was carried out according to Snedecor and Cochran (1972). Means were compared using the L. S. D. values at 0.05 level.

RESULTS AND DISCUSSION

The effect of wounding and different concentrations of IBA : 0, 100, 2000 and 3000 ppm on rooting were studied. Table 1 shows the percentage of rooting , number of roots and total root growth per cutting of MM 106, in season 1986. MM 106 cuttings treated by wounding + 2000 ppm IBA, gave the highest rooting percent (86.66%), number of roots per cutting (4.00) and total length of roots per cutting (16.80cm.). The lowest data of rooting percent , number of roots per cutting and total length of roots per cutting were recorded for cuttings of control (0.00). Data of rooting percent, number of roots per cutting and total length of roots per cutting were intermediate for cuttings treated by wounding, wounding + 1000 ppm IBA and wounding + 3000 ppm IBA.

Table 1. Percentage of rooting, number of roots and total length of roots of wounded MM 106 cuttings , treated with different concentrations of IBA, in 1986.

Treatments	Percentage of Rooting	Number of roots / cutting	Total length of roots (cm)/cutting
Wounding	60.00	3.00	11.60
Wounding + 1000 ppm IBA	60.00	3.00	13.27
Wounding + 2000 ppm IBA	86.66	4.00	16.80
Wounding + 3000 ppm IBA	53.33	2.33	7.77
Control	0.00	0.00	0.00
L.S.D. (0.05) for Treatment	13.28	0.94	5.64

Table 2. Rooting percent of MM 106 cuttings wounded in different ways and treated with different concentrations of IBA, in 1987.

Treatments	Wounding base of cuttings	Split cut at base of cuttings	Longitudinal cut at base of cuttings
Wounding	80.00	66.66	66.66
Wounding + 1000 ppm IBA	46.66	80.00	80.00
Wounding + 2000 ppm IBA	20.00	86.66	80.00
Wounding + 3000 ppm IBA	26.66	46.66	60.00
Control	15.00	0.00	0.00

L.S.D. (0.05) for Treatments = 13.15

L.S.D. (0.05) for Wounding = 10.19

L.S.D. (0.05) for Treat. X Wounding = 22.78

In 1987, the effect of different ways of wounding and IBA concentration on MM 106 apple rootstock were studied. Table 2 shows the percent of rooting for wounding cutting + 1000 ppm, wounding + 2000 ppm. wounding + 3000 ppm and control. Data revealed that, the highest rooting percent was recorded for cuttings treated by wounding base cuttings (80%) while the lowest rooting percent was for control (15%) . Data for other treatements were intermediate fot the percent rooting . Cuttings wounded by split cut at base gave the highest rooting percent when it was treated by 2000 ppm IBA (86.66%) . The lowest rooting percent was the control (0.0) . Longitudinal cut made at base of cutting gave the highest percent of rooting (80%) when it was treated by 1000 ppm IBA or 2000 ppm IBA. Least percent of rooting was for the control (0.0), while data were intermediate for wounded cuttings or wounded + 3000 ppm IBA cuttings.

Results recorded for number of roots per cutting for MM 106 wounded by three methods and treated by different concentrations of IBA, revealed that cuttings treated by wounding base for cutting + 1000 ppm IBA gave the highest number of roots per cutting (10.33). Control gave the lowest number of roots (4.66). Concerning wounding by split cut at base of cuttings, data revealed that the highest number of roots per cutting was for wounded cuttings + 1000 ppm IBA (7.0), control had no roots. With regard to wounding by longitudinal cut at base of cutting, data of number of roots per cutting were similar for treatments including wounding, wounding + 1000 ppm IBA and wounding + 2000 ppm IBA (6.66). Control cuttings did not give any roots (Table 3).

Results of total root growth per cutting shown in Table 4, revealed that the highest length was for cuttings wounded at base + 1000 ppm IBA (93.31cm) and the least length was for the contorol (27.86 cm). When wounded was split cut at base of cutting, the highest total root growth per cutting was (57.97cm). without treated by IBA. The control gave the lowest total length of roots (0.0cm). Longitudinal cut at base of cutting gave very close results for total growth of roots per cutting , wounding cutting + 1000 ppm IBA and wounding cutting + 2000 ppm IBA (37.17, 36.47 and 36.53 cm). Control cutting gave 0.0cm. of total length of roots.

Results presented here show marked effect of wounding + 2000 ppm IBA at the first season. In the second season, split cut at base of cuttings was the best method of wounding + 2000 ppm IBA which gave high percent of rooting. Similar results were obtained by Hartmann and Kester. (1972). Howard *et al.* (1979). Haward 1980, and Ibrahim *et al.* (1978).

Table 3. Number of roots on MM 106 cuttings wounded by different ways and treated with different concentrations of IBA, in 1987.

Treatments	Wounding base of cuttings	Split cut at base of cuttings	Longitudinal cut at base of cuttings
Wounding	8.33	6.66	6.66
Wounding + 1000 ppm IBA	10.33	7.00	6.66
Wounding + 2000 ppm IBA	5.66	6.33	6.66
Wounding + 3000 ppm IBA	6.33	4.66	4.00
Control	4.66	0.00	0.00

L.S.D. (0.05) for treatment = 2.30

L.S.D. (0.05) for Wounding = 1.78

L.S.D. (0.05) for treat. X wounding = 2.30

Table 4. Total growth of roots in MM 106 cuttings wounded by different ways and treated with different concentrations of IBA, in 1987.

Treatments	Wounding base of cuttings	Split cut at base of cuttings	Longitudinal cut at base of cuttings
Wounding	67.83	57.97	37.17
Wounding + 1000 ppm IBA	93.31	51.90	36.47
Wounding + 2000 ppm IBA	56.20	44.73	36.53
Wounding + 3000 ppm IBA	38.93	19.06	13.47
Control	27.86	0.00	0.00

L.S.D. (0.05) for Treatment = 20.81

L.S.D. (0.05) for Wounding = 26.86

L.S.D. (0.05) for Treat. X wounding = N. S.

Fig 1. Effect of wounding and different concentrations of IBA on rooting of MM 106 cuttings in 1986.

Fig 2. Effect of wounding base of cutting + 2000 ppm IBA on rooting of MM 106 cuttings in 1987.

Fig 3. Effect of split cut at base of cutting +2000 ppm IBA on rooting of MM 106 cuttings in 1987.

Fig 4. Effect of longitudinal cut at base of cutting on rooting of MM 106 cuttings in 1987.

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تأثير طرق التجريح والمعاملة بحامض الأندول بيوتيريك على تجذير العقل الساقية لتفاح مالنج مرتون ١٠٦

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أجريت هذه الدراسة على العقل الساقية لتفاح مالنج مرتون ١٠٦ وذلك خلال موسمى ١٩٨٦ ، ١٩٨٧ حيث عوملت العقل فى العام الأول بتجريح قاعدة العقلة مع استعمال تركيزات مختلفة من حامض الأندول بيوتيريك وهى صفر ، ١٠٠٠ ، ٢٠٠٠ ، ٣٠٠٠ جزء فى المليون ، أما فى عام ١٩٨٧ فكانت المعاملات هى : تجريح قاعدة العقله ، شق قاعدة العقلة ، شق طولى لقاعدة العقلة (قشط) مع إستخدام نفس تركيزات الأندول المستعملة فى العام الأول . وأوضحت النتائج مايلى :

١ – فى عام ١٩٨٦ كان أفضل تركيز لحامض الأندول بيوتيريك هو ٢٠٠٠ جزء فى المليون مع تجريح قاعدة العقلة حيث اعطته زيادة معنوية فى النسبة المئوية لتجذير العقل ، عدد الجذور واطوال الجذور .

٢ – عام ١٩٨٧ لوحظ تميز عقل تفاح مالنج ١٠٦ المعاملة بشق قاعدة العقلة مع تركيز ٢٠٠٠ جزء فى المليون من حامض الأندول بيوتيريك حيث أعطت أعلى نسبة مئوية للتجذير عن باقى العقلة المعاملة سواء بطريقة التجريح ، أو شق طولى لقاعدة العقلة (قشط) مع المعاملة الهرمونية بتركيزات ١٠٠٠ ٣٠٠٠ جزء فى المليون .

٣ – كانت أقل النتائج فى العقل التى لم يجرى لها أى معاملة تجريح أو استعمال للتركيزات المختلفة من حامض الأندول بيوتيريك .