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EFFECT OF DIFFERENT GROWTH REGULATORS ON BUD BURST AND ROOTING IN SOME FRUIT CUTTINGS

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SUMMARY

In this study the effect of Naphtyl Acetic Acid (NAA), Ascorbic Acid (AA) and Indole Butyric Acid (IBA) on rooting of mulberry and fig cuttings; and besides, the effect of Alar (B-9), and Salicylic Acid (SA) on bud burst of some peach, cherry and pear cuttings were investigated.

NAA (100, 200, 400 ppm) increased significantly both rooting percentage and root dry weight in the hardwood cuttings of Bursa Siyahı fig variety. Also it had the same effect on the root dry weight of Ichinose mulberry variety in the experimental year of 1985. On the other hand, AA (100, 500, 1000, 2000 ppm) had no significant effect on rooting percentage and root dry weight of mulberry and fig cuttings. NAA (100, 200 ppm) had also increased root dry weight of Ichinose cuttings in 1986. But IBA did not show promoter effect on the rooting of the cuttings of both Ichinose mulberry and Bursa Siyahı fig varieties.

Alar (2000, 4000 ppm) delayed first bud burst 1-4 days, and mean bud burst 2-6 days in peach, cherry and pear cuttings in 1985. SA (500, 1000, 2000 ppm) delayed first bud burst 1-2 days and mean bud burst 1-4 days in cherry and peach cuttings. Alar (2000, 4000, 8000 ppm) delayed first bud burst 1-4 days and mean bud burst 2-8 days and SA (4000 ppm) delayed first bud burst 0-2 and mean bud burst 3-7 days in pear cuttings in 1986.

Neither Alar nor SA affected the total bud burst percentages in the two years of experiment.

ÖZET

Bazı Meyve Türlerinin Çeliklerinde Köklenme ve Tomurcuk Sürmesi Üzerine Farklı Büyüme Düzenleyicilerinin Etkisi

Bu araştırmada Naftalen Asetik Asit (NAA), Askorbik Asit (AA) ve Indol Butirik Asit (IBA)'nın dut ve incir çeliklerinin köklenmeleri; Alar (B-9) ve Salisilik Asit (SA)'in ise bazı şeftali, kiraz ve armut çeliklerinde tomurcukların sürmesi üzerine etkileri araştırılmıştır.

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1985 yılında NAA'in 100, 200 ve 400 ppm'lik dozları Bursa Siyahı incir çeşitinin odun çeliklerinde köklenme oranını ve kök kuru ağırlığını; Ichinose dut çeşitinin çeliklerinde ise sadece kök kuru ağırlığını önemli ölçüde arttırmıştır. Aynı yıl AA nin 100, 500, 1000 ve 2000 ppm'lik dozları her iki çeşitin çeliklerinde köklenme oranı ve kök kuru ağırlığı üzerine önemli etki yapmamıştır. NAA'nın 100 ve 200 ppm'lik dozları 1986 yılında da Ichinose çeliklerinde kök kuru ağırlığını arttırmıştır. IBA'nın 100, 200 ve 400 ppm'lik dozları ise aynı yılda ne dut; ne de incir çeliklerinde köklenmeyi olumlu yönde etkilememiştir.

Alar'ın 2000 ve 4000 ppm'lik dozları 1985 yılında şeftali, kiraz ve armut çeliklerinde ilk tomurcuk sürmesini 1-4 gün, ortalama (% 50) tomurcuk sürmesini 2-6 gün geciktirmiştir. SA'in 500, 1000 ve 2000 ppm'lik dozları ise kiraz ve şeftali çeliklerinde ilk sürmeyi 1-2 gün, ortalama sürmeyi 1-4 gün geciktirmiştir. 1986 yılında Alar'ın 2000, 4000 ve 8000 ppm'lik dozları armut çeliklerinde ilk sürmeyi 1-4 gün, ortalama sürmeyi 2-8 gün; SA'in 4000 ppm'lik dozu ise ilk sürmeyi 0-2 gün, ortalama sürmeyi 3-7 gün geciktirmiştir. Alar ve SA iki deneme yılında da tomurcuklarda toplam sürmeyi etkilememiştir.

INTRODUCTION

Late spring freeze is a very important factor in fruit growing in west Anatolia. Sometimes a minimum delay of 5-10 days in bud burst induced by using certain compounds could provide considerable protection against spring frosts in this region. On the other hand, increasing of the rooting ability of some fruit cuttings, which used in the vegetativa propagation widely, is also very necessary.

Some efforts have been exerted on delaying of bud burst by using Ethephon (CEPA), Gibberellic Acid (GA), Alar (B-9), Abscisic Acid (ABA), Cycocel (CCC) in the last decades (Özbek et al. 1973, Eriş 1976, Westwood 1978, Gülşen 1981, Eriş and Çelik 1981). Ethephon is one of the promising compounds in this respect and it could retard the flowering 3-6 days in some apricot cultivars (Özbek et al. 1973, Gülşen 1981) and 19 days of bud burst of Chaush grape cuttings (Eriş and Çelik 1981).

Alar generally delayed blooming a few days (1-4 days) in some apricot cultivars when applied to the trees in the autumn (Özbek et al. 1973, Gülşen 1981). Alar was also found to be effective on delaying of bud burst of Chaush grape cuttings (Eriş and Çelik 1981). It retarded the first bud burst 7 days and mean bud burst 8 days in this cultivar.

Figs generally to be considered easy to propagate (Özbek 1978). However, specific recommendation on rooting of Bursa Siyahı cv. cuttings is not known.

Ichinose mulberry cultivar which grown for its leaves can be propagated by softwood and hardwood cuttings (Ryu 1977). Ryu (1977) recommended 10-20 ppm or 2000-4000 ppm NAA for softwood and 200-300 ppm or 7000 ppm NAA for hardwood cuttings. He also mentioned that the basal portion of the cuttings should be heated at 21°C during rooting. Konarlı et al. (1977) determined on Ichinose cv. that rooting percent and the number of root per cutting were much more those taken in November and March than those taken in October. They also stated that IBA (1000-4000 ppm) positively affected the rooting of cuttings in November. However this effect disappeared in March's cuttings (Konarlı et al. 1977).

MATERIALS and METHODS

Cuttings of Red Haven and Dixired peaches; Early Burlat cherry; B.P. Morettini and Ankara pears were taken on the 7th of March in 1985 and on the 4th of March in 1986 when they were during imposed dormancy. After preparing of cuttings which had two shoot buds were dipped quickly in different concentrations of Alar (B-9) and Salicylic Acid (SA) as shown in Table 1; and then they placed in a bottom heated perlite medium which held at 23°C ± 2°C. The bud burst on cuttings had been observed every other day for 30-35 days. So, the both time of firstbud burst and mean bud burst (50 % bud burst) were determined.

Ichinose mulberry and Bursa Siyahı figcuttings were taken on the 14th of March and the 12th of March in 1985 and 1986 respectively. They were treated with different concentrations of Naphtyl Acetic Acid (NAA), Ascorbic Acid (AA) and Indole Butyric Acid (IBA) as shown Table 1. Cuttings were placed in a bottom heated perlite medium and the temperature was held at 23°C ± 2°C during rooting. The cuttings had also been under intermittent mist which automatically controlled. Rooting was accounted as rooting percentage (%) and root dry weight (g).

Table: 1
The Application Schedule of Various Concentrations of Chemicals Used In the Experiment (1985 and 1986)

Species	Cultivars	Chemicals and their concentrations (ppm) 1985			1986
Peach	Red Haven	Alar	1000	Alar	2000
	Dixired		2000		4000
Cherry	Early burlat		4000		8000
Pear	B.P. Morettini	SA	500	SA	4000
			1000		
	Ankara		2000		
Fig	Bursa Siyahı	AA	100	IBA	100
			500		200
			1000		400
			2000		
Mulberry	Ichinose	NAA	100	NAA	100
			200		200
			400		400

Randomized plot design with three replicates was used. Number of cuttings per replicate were 20 for Alar and SA treatments and 10 for NAA, AA and IBA treatments. Results were evaluated by the Analysis of Variance Method and the mean seperation was by the Duncan's Multiple Range Test.

Effect of Chemicals On Rooting

Rooting percantages of Ichinose cuttings were high (96.6-100 %) regardless to the treatments in 1985 (Fig. 1). But root dry weights 0.627 g, 0.541 g and 0.360 g obtained from 400, 200 and 100 ppm of NAA treatments respectively, were significantly higher than the other treatments (Table 2). AA did not increase the root weight (0.115-0.160 g) compared with the control (0.068 g) (Table 2).

NAA also increased the rooting ability of Bursa Siyahı cuttings in 1985 (Fig. 1). 80 % rooting and 1.974 g root dry weight obtained from the application of 100 ppm NAA. They were more higher than the other treatments and control significantly (Table 2). 200 ppm NAA had also useful effect on dry weight (Table 2). On the other hand AA did not increase either rooting percentages or root dry weights (Table 2).

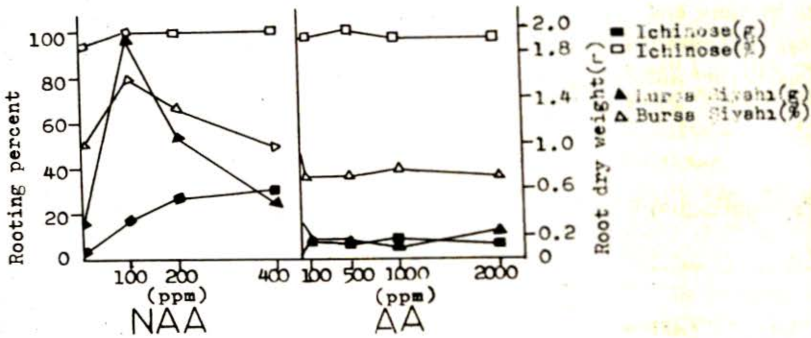

Figure: 1

Effect of various concentrations of NAA and AA on rooting percentage and root dry weight of Ichinose mulberry and Bursa Siyahı fig cuttings in 1985.

The positive effect of NAA on root dry weight of Ichinose cuttings continued in 1986 and the best result obtained from 100 ppm NAA (1.559 g). It always gave higher value than other NAA treatments and the control (0.584 g) and the IBA treatments (0.064-0.424 g) (Table 3). However, neither NAA nor IBA increased the rooting percentage of Bursa Siyahı Cuttings in 1986 (Table 3) (Fig. 2).

These results indicated that NAA treatments positively affected the rooting of Ichinose hardwood cuttings. Many and Long roots were formed by NAA treatments. So, the possibility of survival of the rooted cuttings could be increased. But the optimum concentration of NAA was changed slightly by the year. Generally 100-200 ppm NAA can be recommended. Ryu (1977) also recommended 100-300 ppm NAA for Ichinose hardwood cuttings. Lower concentrations of IBA (100-400 ppm) had not a good effect on rooting of the same cultivar. Konarlı et al. (1977) determined that 2000 ppm IBA increased the number of root per cuttings. This result is partly different from our result. Although the concentration of IBA used Konarlı et al. (1977) was more higher than we used.

Table: 2

Effect of Various Concentrations of NAA and AA on Rooting Percentage and Root Dry Weight of Ichinose Mulberry and Bursa Siyahı Fig Cuttings (1985)

Chemicals and their	Concentrations (ppm)	Rooting percentage* (%)	Root dry weight* (g)
		ICHINOSE (Mulberry cv.)	
NAA	400	100 a	0.627 a
	200	100 a	0.541 a
	100	100 a	0.360 b
Control		96.6 a	0.068 c
AA	2000	96.6 a	0.132 c
	1000	96.6 a	0.160 c
	500	100 a	0.115 c
	100	96.6 a	0.129 c
		BURSA SİYAHI (Fig cv.)	
NAA	100	80.0 a	1.974 a
	200	66.6 ab	1.118 b
	400	50.0 bc	0.521 c
Control		50.0 bc	0.305 cd
AA	2000	36.6 c	0.248 cd
	1000	40.0 c	0.108 d
	500	36.6 c	0.125 d
	100	36.6 c	0.129 d

* $p = 0.05$

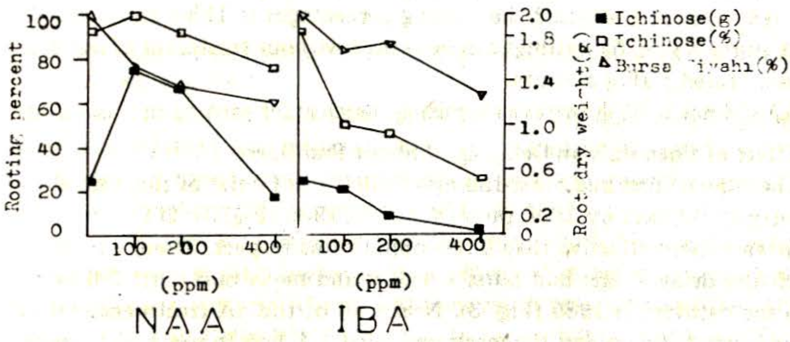

Figure: 2

Effect of various concentrations of NAA and IBA on rooting percentage and root dry weight of Ichinose and Bursa Siyahı Cuttings in 1986.

Table: 3
Effect of Various Concentrations of NAA and IBA on Rooting Percentage and Root Dry Weight of Ichinose Mulberry and Bursa Siyahı Fig Cuttings (1986)

Chemicals and their Concentrations (ppm)		Rooting percentage* (%)	Root dry weight* (g)
		ICHINOSE (Mulberry cv.)	
NAA	100	100 a	1.559 a
	200	93.3 a	1.313 b
	400	76.6 b	0.376 d
Control		93.3 a	0.584 c
IBA	100	50.0 c	0.424 cd
	200	46.6 c	0.185 e
	400	26.6 c	0.064 e
		BURSA SİYAHI (Fig cv.)	
Control		100 a	–
NAA	100	76.6 b	–
	200	66.6 b	–
	400	60.0 b	–
IBA	100	83.3 b	–
	200	86.6 b	–
	400	63.3 b	–

* $p = 0.05$

Important differences were determined in rooting of Bursa Siyahı fig cuttings, while rooting percentage and root dry weight were being increased by NAA in 1985, neither NAA nor IBA affected the rooting percentages in 1986. In general it is stated that Bursa Siyahı fig cuttings can be rooted without treatment of rooting agent in bottom heated perlite medium.

AA did not to be shown as a promising chemical for rooting in this experiment.

Effect of Chemicals on Delaying of Shoot Bud Burst

The time of first bud burst and mean (50 %) bud burst of the treated cuttings were delayed 1-2 days by 1000 ppm of Alar in 1985 (Fig. 3). 2000 and 4000 ppm of Alar were more effective than 1000 ppm in this respect. These two concentrations of Alar delayed first bud burst 1-4 days and mean bud burst 2-6 days according to the cultivars in 1985 (Fig. 3). Nearly all of the SA treatments delayed the first bud burst 1-2 days and the mean bud burst 1-4 days in some cultivars cuttings (Fig. 3). Neither Alar nor SA effected the total bud burst percantages significantly in cuttings tested.

The retardation of Alar on B.P. Morettini and Ankara cuttings were 1-4 days in first bud burst and 2-10 days in mean bud burst in 1986 (Fig. 4). The delaying effect of Alar was more clear on Ankara than on B.P. Morettini. The differences between the effect of the concentrations (2000, 4000, 8000 ppm) was not clear.

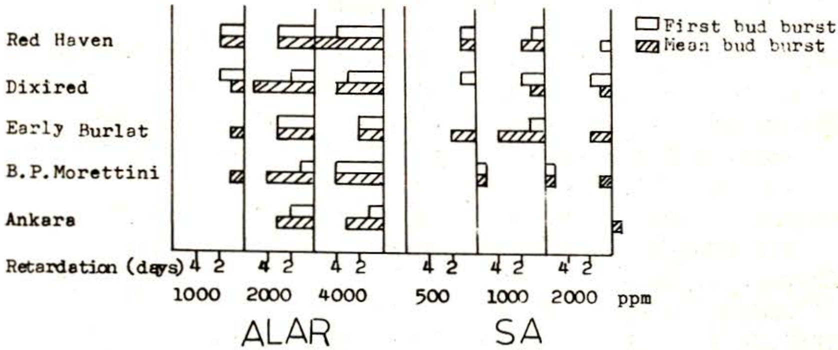

Figure: 3

Delaying effect of various concentrations of Alar and SA on shoot bud burst of some peach, cherry and pear cultivars cuttings in 1985.

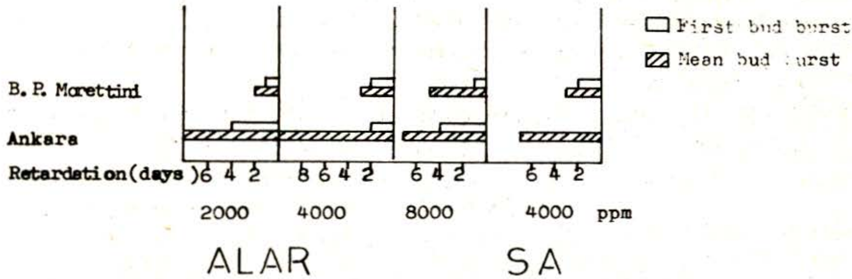

Figure: 4

Delaying effect of various concentrations of Alar and SA on shoot bud burst of pear cuttings in 1986.

SA (4000 ppm) delayed the first bud burst 0-2 days and the mean bud burst 3-7 days in 1986 (Fig. 4).

The results obtained from Alar applications in this study generally supported by the results obtained from autumn Alar applications of the apricot flower buds which retarded 1-4 days (Özbek et al. 1973) and early spring applications of Chaush grape buds which retarded 7-8 days (Eriş and Çelik 1981).

2000, 4000 and 8000 ppm of Alar had nearly similar effect. Although 4000 and 8000 ppm were slightly higher in their effects. And 1000 ppm was much less effective. In Chaush cuttings Alar at 500 ppm much more effective than 1000 and 2000 ppm (Eriş and Çelik 1981). In apricots Alar at 8000 ppm sometimes much more effective than the lower concentrations (Özbek et al. 1973).

Nearly all concentrations of SA did not retard bud burst as much as Alar. Only 4000 ppm of SA retarded the period of 50 % bud burst 7 days in Ankara pear cuttings in 1986.

Alar and SA had not significantly affected the total bud burst in this experiment as previously reported for Alar (Eriş and Çelik 1981).

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