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NOTE
EFFECTS OF SOME SALTS AND ACIDS ON CITRUS LEAF ABSCISSION[1]

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ABSTRACT

Ions of K, Na and Cl showed little influence whereas those of $H_2^+PO_4^{-3}$, H_3O^+ and OH^- produced marked effects on abscission in citrus explants. Abscission appeared to be a function of both high and low pH.

INTRODUCTION

Several acids, growth chemicals and amino acids have been found to influence abscission of leaves and fruits in plants (3,6,7). However, information about the effects of salts and mineral acids is limited. Such a knowledge would be useful for the areas where plants are grown in acidic or alkaline and salty soils, as is the case in many parts of Iran. This study examined the influence of some inorganic salts and mineral acids on leaf abscission in citrus, using the explant technique described by Livingston (4).

MATERIALS AND METHODS

Fully expanded green leaves of sour orange *(Citrus aurantium* L., local variety) were obtained from Fahandej garden, Shiraz, Iran. Immediately after separating a leaf from the branch, the leaf blade was trimmed off and an explant made consisting of a 7.5 mm portion of petiole and 10 mm of leaf mid rib. Ten explants were placed in each petri dish containing 20 ml of 1.5% agar with HCl, KOH, KCl, NaCl, KH_2PO_2 or H_3PO_4 at concentrations of 0, 10^{-5}, 10^{-4}, 10^{-3}, 10^{-2} or 10^{-1} M. Petiole ends of explants were inserted into the agar medium to a depth of about 5 mm. Each petri dish was considered a treatment which was replicated three times in a randomized block design.

To determine if the explants were in their final stage of separation a force was applied to the explant by pressing the top of the mid-rib with forceps. Observations were made every 24 hr to determine the rate of abscission.

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RESULTS AND DISCUSSION

Data given in Table 1 indicate that the chemicals tested accelerated abscission of explants, although the magnitude of the effect varied considerably between chemicals. Inorganic ions appear to differ in their capacity to influence the abscission process. Ions of K, Na and Cl had no measurable influence on abscission at 10^{-1} M concentration whereas those of H and PO_4 had a marked influence on abscission at 10^{-2} M. Comparing the effects of HCl, KCl, and KOH on abscission of explants it appears that the abscission was a function of pH since concentration of 10^{-1} M H_3O^+ or 10^{-1} M OH^- were both active, H_3O^+ being more effective than OH^-. High and low pH induces a stress in the plants. It has been established that plant tissues under stress from chemicals or physical factors produce ethylene (1,5) and it is known that ethylene accelerates the abscission process in plants (2). Possibly the high pH of the growth medium produces a stress in the plants resulting in a condition that led to an acceleration of abscission. Thus the high pH of soil (7.8) and salty irrigation water may be major factors contributing to abnormal defoliation in citrus groves of Jahrom, Iran.

Table 1. Effects of chemicals tested on the time required for 50% of the explants to show abscission.

Molar Concentration	Chemical* KOH	KCl	KH_2PO_4	NaCl	H_3PO_4	HCl
0	192+b**	192+a	192+b	192+a	192+c	192+c
10^{-5}	192+b	192+a	192+b	192+a	192+c	192+c
10^{-4}	192+b	192+a	192+b	192+a	192+c	192+c
10^{-3}	192+b	192+a	192+b	192+a	192+c	192+c
10^{-2}	192+b	192+a	192+b	192+a	84 b	96 b
10^{-1}	29 a	192+a	64 a	192+a	16 a	24 a

*- A plus sign indicates that at the end of the test (192 hr) 50% of the explants had not abscised.

**- Mean separation within each column by Duncan's multiple range test, 5% level.

NOTE

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