Polyamine Biosynthesis in Lettuce Leaf under Salt Stress

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Objectives

A chemical property of the green house soil used to salt accumulation by which rhizospheric stress can be provoked In general, lime application to salt accumulated soil has been used to alleviate the salt stress It has been well known that Ca fertilization has increased the efflux of NO_3^- or decreased absorption of NO_3^-. Increases in polyamine biosynthesis have been observed in a variety of developmental of stress situations (Evans and Malmberg, 1989). It has been demonstrated that polyamines (Pas) appear to substitute at least in part for the physiological responses under Ca-regulation such as protoplast stabilization, thylakoid membrane preservation, retardation of chlorophyll degradation during senescence and so on (Kim and Heinrich, 1995) Thus, to investigate lime effect on polyamine biosynthesis under high salt stress is of major interest.

Materials and Methods

- Electrical conductivity (EC) of upland clay soil with low fertility was adjusted to 1 (low salt) and 5 dSm^{-1} (high salt) using compost and chemical fertilizer The physicochemical properties of soils were shown in tablel 1. Lime was applied in level of 200 Kg $10a^{-1}$ 30 days before transplanting Lettuce (*Lactuca* sativa cv Chungchima) were sawn in plug bed, Twenty five day old seedlings were transplanted to vinyl house with or high EC, respectively.
- Polyamine analysis was carried out by earlier Kim and Heinrich's method (1995). All experiments were repeatedly carried out in triplicate.

RESULTS AND DISCUSSION

As shown in 1, total polyamine content in the leaves of lettuce grown in high salt accumulated soil(HSAS) was differed . However, fertilization of nitrogen and lime decreased to 8umol level. Interestingly, conjugated polyamines were over 40% in all tested leaves. Lime application on lessoning the salt stress on the basis of increase in polyamine In general. It is well known that polyamine biosynthesis is enhanced under nutrient deficiency(Smith, 1985).

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The ratio of diamine to total polyamine is increased as like as our results(table 3). Under high salt stress, *i e.*5dSm $^{-1}$, the ratio is about 1.5 fold higher than control(1dSm^{-1}). The ratios in lettuce leaves are reduced with N-fertilization. Total polyamine biosynthesis and their ratios of free to total amine were more active in low salted soil and standard nitrogen fertilized soil grown lettuce than in treated ones. If was clearly found that putrescine biosynthesis was progressed under salt stress and sufficient nitrogen supplement.

Table 1. The biosynthesis of three different polyamnine titers in the leaves of lettuce grown under high salt and nitrogen stress

Treatments	Polyamine (nm g^{-1} fw)F/TB/TC/T				F/T	B/T	C/T
	Free	Bound	Conjugated	Total			
Soil EC							
1 d Sm^{-1}	3,408	2,915	4,168	10,492	0.32	0.28	0.40
2 d Sm^{-1}	3,440	2,391	4,848	10,678	0.28	0.22	0.45
N fertilization							
1/2 ST*	3,669	2,554	4,204	10,426	0.35	0.24	0.40
Soil testing	4,178	3,789	5,688	13,654	0.24	0.28	0.42
2 fold ST	2,632	1,765	3,995	8,392	0.31	0.21	0.48
2 fold ST+lime	3,278	2,504	4,147	9,868	0.33	0.25	0.42

*ST . Total fertilization of N-P_2O_5-K_2O=20.0-5 9-12.8 Kg 10a^{-1} subtracting the contents included in experimental soils.

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