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FLUCTUATION OF FOLIAR Ca, Mg AND Na LEVEL I N LEMON CV. ASSAM LEMON DUE TO GROWTH FLUSHES, AGE AND TYPES OF SHOOT

Akali Sema and P. L. Kar
Department of Horticulture
School of Agricultural Sciences and Rural Development
Medziphema, Nagaland - 797 106, INDIA

ABSTRACT

Foliar Ca, Mg and Na was significantly influenced by growth flushes during both years of observation with highest Ca level in winter flush, Mg in spring fllush and Na in winter and rainy flushed. Age of leaf also had significant influence on follar Ca, Mg and Na content. Ca level showed an increasing tren till the last date of observation with slight, variation, while Mg and Na level was more or less steady throughout the observation. Types of shoot failed to influence the follar Ca, Mg and Na content in both the years, however, lateral shoot had an edge over terminal shoot. Most of the interactions also failed to significantly influence the follar Ca, Mg and Na content with few exceptions.

INTRODUCTION

The nutritional status of tree is one of the most important factor goveming the fruitfulness of fruit tree. Assessment and efficient monitoring of nutritional need using foliar analysis is one of the best way to achieve high economic yield with quality fruits (Bnargava and Chadha, 1988). The composition of leaf can serve as a genuine reflection of the nutrient status of plant. Citrus tree is known to contain more Ca than any other mineral plant nutrient. The gain of Ca was related with leaf dry weight which suggested that it probably was an integral part of the leaf tissue. However, the status of Ca in leaf sample collected from mandarin orchard in NEHR was deficient (Prasad *et al.* 1981), which might be due to acidic nature of soil and leaching loss of base material due to heavy rainfall. Mg is aconstituent of chlorophyll, plays a significant role in photosynthesis and carbohydrate metabolism. Growth stimulation by Na is caused mainly by its effect on cell expansion and water balance of plant (Marschner, 1986). Concentration of foliar Ca, Mg and Na were noted to be influenced by various factors such as growth flushes, location, types of branches, root stock, age of leaf and plant and, cultivars (Casu and Agabbio, 1980/81; Lyngdoh, 1991). The present experiment was therefore, an attempt to study the infllluence of some of these factors such as growth flushes, age of leaf and types of shoot on foliar Ca, Mg and Na contents under agroclimatic conditions of Nagaland.

MATERIALS AND METHODS

The experiment was carried out in the KVK Farm, ICAR, situated at 305 altitude with geographical location of 25°36' to 27°40'N latitude and 93°20' to 95°15' longtitude. The soil of the experimental site is of sandy loam in nature with pH ranging from 5.97 to 5.20. organic carbon from 1.95 to 2.12% and available NPK from 42.72 to 47.43 kg/ha, 5.25 to 6.87 kg/ha and, 17,63 to 18.93 respectively. Three pairs of leaves per shoot were collected from middle portion of five lateral and five terminal shoots in respect of spring, rainy and winter flushes per replication at monthly interval from shoot tagged at the beginning of each flushes. The samplies were then brought to the laboratory and washed properlly, dried and grounded. The leaf samples were digested in di-acid mixture and determination of Ca and Mg were carried out in Atomic Absorption Spectrophotometer while Na was determined by flame photometry method.

RESULTS AND DISCUSSION

Ca content was strongly influenced by different growht flushes. Leaves of winter season flush had maximum Ca (Table 1) than other flushes in both the years. These results are in agreement with the findings of Lyngdoh (1991) who reported that foliar Ca level was higher in winter flush than spring flush. However, there are others who reported higher Ca level in autumn flush (Gururani and Singh, 1983). It is, therefore, evident that the relationship of water, Ca and growth flush is not a fixed rellationship and can be altered due to several factors such as age, season uptake pattern from soil internal regulatory mechanism of distribution of element, fruiting density indifferent types of shoots, etc. Significant influence of leaf age on foliar Ca level was evident from the perusal of results in both the years (Table 1). In general, Ca content increased upto 5 months, then remained more or less steady till the end of season. The increasing trend of Ca in the early stage was also reported by Singh et al. (1990). Leaves of lateral shoot had slight edge over terminal shoot with regard to its influence on foliar Ca level though influence was not significant. Interaction between growth flush and age of leaf in both the years had significant influence on foliar Ca level.

It was observed that foliar Mg content was significantly influenced by growth flushes. Mg content was found to be maximum in spring flush than winter and rainy flush. Singh and Kanwar (1982) did not obtain any significant difference in various growth flushes. Such differences in the above findings may be accounted to variation in external factors of climate prevailing during the years under study as welll as internal factors of uptake, translocation, distribution and redistribution of elements within the plant. Age of leaf had marked influence on Mg content Types of shoot as well as interactions except growth flush X age of leaf, did not have any significant influence on foliar Mg content.

Different growth flushes produced detectable and strking variation on foliar Na content in both the years. Casu and Agabbio (1980/81) also obtained significant effect of growth flushes on foliar Na content. The degree of variability in climatic condition that affect the plant nutrition might ascribe to trhe variation of foliar Na concentration in different growth flushes. Na content of foliage was low initiallly, then increases with a sllight decline towards the end of observation. This finding have close similarity with the observations of Lyngdoh (1991). The increase and decrease in the level of foliar nutrients was attributed to dry matter accumulation

in leaf, which rather dilute or augment the status of the element concerned causing decrease and increase of the composition of the element. There was no significant influence of types of shoot on foliar Na content in both the years, while most of the interactions had marked effect on foliar Na content.

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Table 1. Variation in the level of Ca, Mg and Na as influenced by flushes, age of leaf and types of shoot in lemon cv. Assam Lemon

	Ca		Mg		Na	
Flushes	1991-92	1992-93	1991-92	1992-93	1991-92	1992-93
Spring	1.52	1.95	0.38	0.36	0.02	0.02
Rainy	1.56	1.89	0.38	0.28	0.02	0.05
Winter	1.74	2.02	0.37	0.27	0.03	0.04
LSD (p=0.05)	0.06	0.04	0.009	0.02	0.004	0.002
Age of leaf						
1	1.51	1.69	0.37	0.27	0.02	0.04
2	1.56	1.79	0.34	0.30	0.02	0.05
3	1.64	1.86	0.37	0.32	0.02	0.05
4	1.67	2.01	0.37	0.32	0.02	0.04
5	1.76	2.01	0.37	0.31	0.02	0.04
6	1.63	1.98	0.37	0.30	0.03	0.04
7	1.56	1.94	0.36	0.32	0.03	9.04
8	1.54	1.79	0.38	0.31	0.03	0.04
9	1.63	1.85	0.38	0.31	0.03	0.04
10	1.51	2.08	0.38	0.32	0.04	0.03
11	1.58	2.23	0.38	0.32	0.03	0.03
12	1.65	2.18	0.35	0.30	0.02	0.03
LSD (p=0.05)	0.13	0.23	NS	0.02	0.006	0.006
Types shoot						
Lateral	1.61	1.96	0.37	0.31	0.03	0.04
Terminal	1.59	1.95	0.37	0.30	0.02	0.04
LSD (p=0.05)	NS	NS	NS	NS	NS	NS
Interaction						
FxM	0.23	NS	NS	0.03	0.01	0.01
MxT	NS	NS	NS	NS	0.01	NS
FxMxT	0.09	0.10	NS	NS	0.01	NS