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### EFFECT OF RESIDUE SALT BITTERS ON THE YIELD AND FOLIAR YELLOWING INTENSITY OF COCONUT PALM

The capacity of soils to supply plant nutrients deteriorates on continued cultivation. Fertilizer practices in coconut garden thus requires revision after few years of cropping and a proper balance of nutrient constituents present in the soil will have to be maintained. Results of comprehensive experiments on coconut with manufactured N P K fertilizers are available in literature. But experimental data on the use of certain by-product materials as manure for coconut are lacking. At present those materials were used by farmers on an arbitrary basis without any precise knowledge. Ramanadan (1973) reported that irrigating the coconut palm with sea water increased the yield of nuts without any deleterious effect. He also found that the addition of common salt @ 4—5 kg per palm per annum along with N P K fertilizer further increased the yield. The present study was aimed to investigate on the efficacy of residue salt bitters (residues left after salt extraction) on the yield and foliar yellowing symptoms of the coconut palm grown under the conditions prevailing at the back-water region of Kerala. The residue salt bitters were obtained from M/s. Sankara Allam Pvt. Ltd., Nagercoil and contained 4—5% N, 4—5%  $K_2O$ , 20—25%  $Mg(OH)_2$ , 4—5%  $Mg Cl_2$  and  $Mg SO_4$ , 10—15% Na Cl and 40—50% moisture. The trial with the material was conducted at the Coconut Research Station, Kumarakom, Kerala, in a randomised block design with 4 treatments replicated four times. Each plot contained eight coconut palms of the West Coast Tall variety having an age group of 35—40 years. There were 4 treatments (Vide Table 1). A uniform dose of 3 kg of 8: 8: 16 mixture and 40 kg of green leaves per tree were applied irrespective of the treatments. River Sand @ 88 cubic metre and lime @ 750 kg per ha were also applied every year during November—December and worked into soil. Observations on the yield of nuts were recorded for five years from 1965. The intensity of foliar yellowing symptoms were scored based on four intensity grades formed according to the per cent of foliar yellowing intensity viz. 1 (upto 10% leaf area showing yellowing symptoms), 2 (11—30%), 3 (31—50%) and 4 (above 50%).

Since the effect of treatments on the yield of nuts is normally manifested only two years after application, the yield of nuts during the interim period 1965 was not considered. The data on the mean yield of nuts per plot of 8 palms are presented in table 1. Statistical analysis of the yield data for individual years (1965—1969) did not reveal any difference between treatments. However, the results of pooled analysis of the data indicated significant difference between treatments and also between years. Use of 2 kg of residue

**Table 1 Effect of residue salt bitters on the yield of coconut palms (Mean yield per plot of 8 palms)**

Treatment	Years					Mean
	1965	1966	1967	1968	1969	
T <sub>1</sub> Control	215.0	363.5	291.8	276.0	241.8	277.6
T <sub>2</sub> residue salt bitters 2 kg/palm basal	190.5	328.5	249.8	220.3	238.3	245.5
T <sub>3</sub> residue salt bitters 2 kg/palm sprayed on leaves	276.3	499.0	349.5	321.3	286.3	346.5
T <sub>4</sub> residue salt bitters 1 kg basal + 1 kg as 2 foliar sprays	317.8	408.0	307.8	305.3	273.0	322.4
Mean	249.9	399.8	299.7	280.7	259.8	—

C. D. for comparison between treatments : 46.72

C. D. for comparison between years : 52.23

**Table 2 Effect of residue salt bitters on the intensity of yellowing in coconut palms. (Mean of total scores per plot of 8 palms)**

Treatment	Years					Mean
	1964	1965	1966	1967	1968	
T <sub>1</sub> Control	14.0	13.5	15.0	17.5	15.0	15.0
T <sub>2</sub> residue salt bitters 2 kg/palm basal	13.8	14.3	15.5	18.8	14.8	15.4
T <sub>3</sub> residue salt bitters 2 kg/palm sprayed on leaves	12.8	11.8	14.0	18.0	15.5	14.4
T <sub>4</sub> residue salt bitters 1 kg basal + 1 kg as 2 foliar sprays	15.0	13.8	14.8	17.5	15.8	15.4
Mean	13.9	14.5	14.8	18.0	15.3	—

C. D. for comparison between years : 2.17

salt bitters as foliar spray (T<sub>3</sub>) was found to be significantly superior to basal application (T<sub>2</sub>) and control. The effect of T<sub>4</sub> was on par with T<sub>3</sub>. The results indicated that foliar application of residue salt bitters was highly effective over soil application of the same. Experiments conducted at the Central Plantation Crops Research Institute, Kasargod showed that the use of common salt has increased yields of coconut palms (Ramanandan, 1973). The response of the residue salt bitters observed in the present study is in conformity with

that report. The maximum yield was recorded in 1966 and lowest yield in 1965. The drop in yield during subsequent years may be due to the exhaustion of the soil consequent on the stimulation observed in 1966. Similar drop was observed by Robert Cecil (1973) also. The effect on yellowing is presented in Table 2. There was no effect of residue salt bitters on the intensity of foliar yellowing. A six year trial with residue sea bitters containing 21.8% N and 2.65% K conducted by Ramanandan *et al.* (1962) had showed similar negative yield response. The yield was lowest during the year of treatments (1964) while its difference between the second (1965) and third year (1966) was statistically not evident. The occurrence of foliar yellowing tend to increase significantly during the fourth year (1967) which can be attributed to the exhaustion of soil nutrients during the preceeding period as suggested by Robert Cecil (1973). The effects of interaction between treatment and years were also not significant.

### സംഗ്രഹം

കരിയപ്പിന്റെ സംസ്കരണവേളയിൽ ലഭിക്കുന്ന അവക്ഷിപ്തം കേരളത്തിന്റെ കായലോരപ്രദേശങ്ങളിൽ വളരുന്ന തെങ്ങുകളുടെ ആദായത്തിലും ഇലപ്പിഴവിലും തോതിലും ഉണ്ടാക്കാവുന്ന വ്യത്യാസങ്ങളെക്കുറിച്ച് കമരകം കേരഗവേഷണ കേന്ദ്രത്തിൽ പാനങ്ങൾ CDS തുറക്കുകയുണ്ടായി. തിരുവനന്തപുരം രണ്ടു കി. ഗ്രാം വീതം മേൽപറഞ്ഞ അവക്ഷിപ്തം ഇലകളിൽ തളിച്ചപ്പോൾ കൂടുതൽ വിളവു ലഭിക്കുന്നതായും എന്നാൽ ഇല മഞ്ഞിപ്പിന് ഇതൊരു പരിഹാരമല്ലെന്നും വ്യക്തമായി.

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