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EFFECT OF DIFFERENT LIGHT INTENSITIES ON THE VEGETATIVE CHARACTERS AND LEAF ANALYSIS OF PINEAPPLE VARIETY 'KEW'

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Pineapple *(Ananas comosus* L. Merr) is a fruit crop having immense possibilities for large scale cultivation in Kerala. In Kerala, the crop is recommended for intercropping in coconut gardens. In ordertoevolve suitable crop management practices under a system of multiple cropping, it is necessary that the extent of shade tolerance of pineapple is ascertained. For this purpose, a study was conducted with the Kew variety of pineapple grown under different levels of controlled light intensities.

Materials and Methods

The experiment was laid out at the Pineapple Research Centre, Vellanikkara, adopting the Randomised block design with four treatments and five replications. The treatments consisted of shade at varying levels of 0, 25, 50 and 75%. Artificia shade was provided by using coconut leaves on *pandals* and the light intensities were adjusted by means of a lux meter.

The vegetative characters studied were, number of leaves produced per plant, D leaf area per piant and percentage dry weight of D leaf for each treatment at three different stages of growth, namely, at 6 months, 1 year after planting and at the time of flowering.

Leaf samples were collected during the above three stages and analysed for their nitrogen, phosphorus, potassium, calcium and magnesium contents.

During March-April, leaf samples were collected and their chlorophyll 'a' 'b' and lota! contents were estimated.

Results and Discussion

Data on the number of leaves produced per plant, D leaf area and percentage dry weight of D leaf are given in Tables 1-3. Results of leaf analysis are given in Tables 4-6.

The number of leaves produced per piant did not differ in shaded and unshaded plants indicating the shade tolerance of the crop, Rolfs (1903) also reported the same phenomenon in pineapple and a different trend in citrus, a shade intolerant species in which the number of leaves produced per plant decreased on shading.

Table 1
Effect of shading on number of leaves produced per plant

Treatments	Mean leaf number per plant		
	*a	b	c
1. 0 per cent shade	17.72	26.42	29.99
2 25 per cent shade	19,52	26.57	31.09
3, 50 per cent shade	20,25	28 35	29.10
4. 75 percent shade	19.54	2625	29 44
CD (p = *0.05%)*	NS	NS	NS

Table 2
Effect of shading on 'D' leaf area

Treatments	Mean 'D' leaf area in cm^2		
	*a	b	c
1. 0 per cent shade	151.18	321.32	339.50
2. 25 per cent shade	216.68	850.45	374.01
3. 50 per cent shabe	225.88	360.82	393.09
4. 75 per cent shade	210.36	379.59	404 06
CD (p= 0.05%)	49,03	37.93	16.79

Table 3
Effect of shading on the percentage dry weight of 'D' leaf

Treatments			
	*a	b	c
1. 0 per cent shade	12.13	14,21	14.50
2. 25 per cent shade	11,43	14.74	13.96
3. 50 per cent shade	11.67	13.95	12.93
4, 75 per cent shade	12.32	12 67	12.68
CD (p = *0.05%)*	NS	NS	1.07**

** The CD is calculated for angular transformed data
* a-six months after planting
b-one year after planting
c-at the time of flowering

Table 4

Effect of shading on N, P and K contents of leaves

Treatments	Nitrogen (%)			Phosphorous (%)			Potassium (%)		
	*a	b	c	a	b	c	a	b	c
1. 0 per cent shade	1.75	1.88	1.91	0.066	0076	0.079	3.92	5.08	4.41
2. 25 per cent shade	1.98	2.13	2.16	0.075	0.082	0.078	3.89	5.45	4.81
3. 50 per cent shade	1.89	2.09	2.11	0.068	0.082	0.082	3.71	4.99	4.63
4. 75 per cent shade	1.92	2.16	2.14	0.058	0.078	0 077	3.59	5.09	4.62
CD (p=0.05)	NS	0.13	0.13	NS	NS	MS	NS	NS	NS

Table 5

Effect of shading on Ca and Mg contents of leaves

Treatments	Calcium (%)			Magnesium (%)		
	*a	b	c	a	b	c
1. 0 per cent shade	0.56	0.44	0.48	0.19	0.19	0.19
2. 25 per cent shade	0.57	0.43	0.46	0.24	0.23	0.24
3. 50 per cent shade	047	0.34	0.38	0.25	0.22	0.25
4. 75 per cent shade	0.29	0.35	0.37	0.29	0.27	0.29
CD (p - 0.05)	0,04	0.04	0.07	0.02	0.02	0.07

Table 6

Effect of shading on chlorophyll ('a', 'b' and 'total') contents of [eaves

Treatments	Chlorophyll 'a' (%)	Chlorophyll 'b' (%)	Chlorophyll total (%)
1. 0 per cent shade	0.012	0,0065	0.0189
2. 25 per cent shade	0.017	O.C093	0.0259
3. 50 per cent shade	0.016	0.0100	0.0254
4. 75 per cent shade	0.044	0.0262	0.0697
CD (p = 0.05)	0.005	0.004	0.006

*a—six months after planting
b—one year after planting
c—at flowering

The D leaf area increased as the intensity of shade increased, the intensities of 50% and 75% showing significantly higher D leaf area as compared to the area in other treatments. Increased leaf area consequent to shading was observed in citrus and apple also (Rolfs, 1903; Gourley, 1920).

The treatments did not show any significant differences in the percentage dry weight of D leaf during the first two stages of growth observations (Table 3). However, at the time of flowering, a slight reduction in the percentage dry weight under shaded conditions was observed, but the extent of reduction was not appreciable even under 75% shade intensity, indicating the shade tolerance of the crop.

Data on the nutrient status of the leaves (Tables 4 and 5) indicate that nitrogen content increased in the leaves under shaded conditions towards later stages of growth. This might either be due to the increased uptake of nutrient or due to the decreased utilisation of the same under shaded situations. It might also be attributed to nutrient sparing action and thus, it would appear that the dose of nitrogenous fertilizers could be reduced under shaded conditions. The phosphorous and potassium contents of leaves did not show any variation both under shaded and open conditions. Calcium content of leaves was found to decrease under shade intensities above 25%.

Increased chlorophyll content in the leaves of shaded plants has been reported by severel workers in different crops such as cocoa by Evans and Murray (1951), in oranges by Shimizu and Torikata (1972) and in apple by Tansev (1976). Data presented in Table 6 on the chlorophyll content of leaves show a progressive increase in the total chlorophyll content with increasing intensities of shade. The pw chlorophyll content in the leaves of open grown plants might be due to the destruction of the pigment under high light intensity. The leaves exhibited a pinkish appearance in open condition especially during summer indicating such a destructive process of chlorophyll in full light intensity. Magnesium content of leaves was also found to increase under shaded conditions (Table 5). Magnesium is one of the constituents of chlorophyll pigment and its accumulation might be due to increase in chlorphyll content in the shaded leaves.

Summary

In studies on the influence of different intensities of shade on the growth behaviour and nutrient status of leaves of pineapple plants, it was found that the pineapple plants tolerated shaded situations even upto 75 per cent. Under shaded situations, increased leaf area and higher contents of nitrogen, magnesium and chlorophyll in leaves were recorded.

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സംഗ്രഹം

കൈതച്ചക്കച്ചെടികളെ, കേവലം 25% സൂര്യപ്രകാശം മാത്രം ലഭിച്ചിരുന്ന സാഹചര്യങ്ങളിലും, നന്നായി വളരുന്നതായി 1978–79ൽ ഹോർട്ടിക്കൾച്ചറൽ കോളേജിൽ നടത്തിയ പരീക്ഷണങ്ങളം പ്രകടമാക്കി.

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