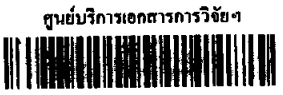

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APPLIED SCIENTIFIC RESEARCH CORPORATION OF THAILAND

COOPERATIVE RESEARCH PROGRAMME NO. 1

PRODUCTION, PROCESSING, AND UTILIZATION OF

KENAF AND ALLIED FIBRES

RESEARCH PROJECT NO. 1/4

EFFECT OF PLANT VARIETY, GROWING CONDITIONS, AND AGRONOMIC FACTORS ON THE YIELD AND QUALITY OF KENAF FIBRE

REPORT NO. 7

COMPARATIVE STUDY OF TRANSPLANTING AND RESEEDING PRACTICES ON THE YIELD OF KENAF

BY

PRAPANDH BOONKLINKAJORN,

PRAWIT KRITTAYANAWACH

ASRCT, BANGKOK 1970

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F O R E W O R D

Cooperative Research Programme No. 1 involves cooperation between ASRCT and many other agencies as set out on the cover of this report.

The present report involves cooperative work between ASRCT (Plant Sciences Group, ARI) and the Department of Agriculture, Ministry of Agriculture (Non Sung Agricultural Experiment Station). It is concerned with a study attempting at the comparison of the transplanting and reseeding operations as responded by the yield of Thai kenaf variety Non Sung 001 at the Non Sung Agricultural Experiment Station, Nakhon Ratchasima.

COMPARATIVE STUDY OF TRANSPLANTING AND RESEEDING PRACTICES ON THE YIELD OF KENAF

By Prapandh Boonklinkajorn* and Prawit Krittayanawach*

SUMMARY

To examine the advantages of the transplanting and reseeding operations on kenaf plants, a study was conducted in 1969 at the Non Sung Agricultural Experiment Station. Results showed that transplanting was conclusively better than reseeding practice in all cases. Recovery of the root of transplanted seedlings is also discussed.

INTRODUCTION

Kenaf (Hibiscus sabdariffa var. altissima) is mainly grown in the north-eastern part of Thailand, where farmers begin planting in May (Kasipar 1967). Farmers in certain parts of Chaiyaphum and Nakhon Ratchasima, however, carry out the operation as early as mid-April (Department of Agriculture 1961). Moreover, planting on 1 April at the Non Sung Agricultural Experiment Station, Nakhon Ratchasima, was found to produce the highest yield (Boonklinkajorn et al. 1970).

Precipitation prevailing in north-eastern Thailand is generally characterized by an initial peak in late May and early June, and a second in mid-September (Figure 1). The two peaks of Nakhon Ratchasima occur about two weeks later, but data for Chaiyaphum are not available. It may be generalized, therefore, that planting kenaf in early April is applicable to all of the north-eastern part of the country, since from then on the precipitation is fairly increasing and is adequate for producing a healthy plant, which will be able to withstand the dry spell prevailing in July. However, the rainfall of each year is subject to irregularities. Dry spells and flooding conditions of a certain extent may occur at any time and any place. The weakest period of a plant so

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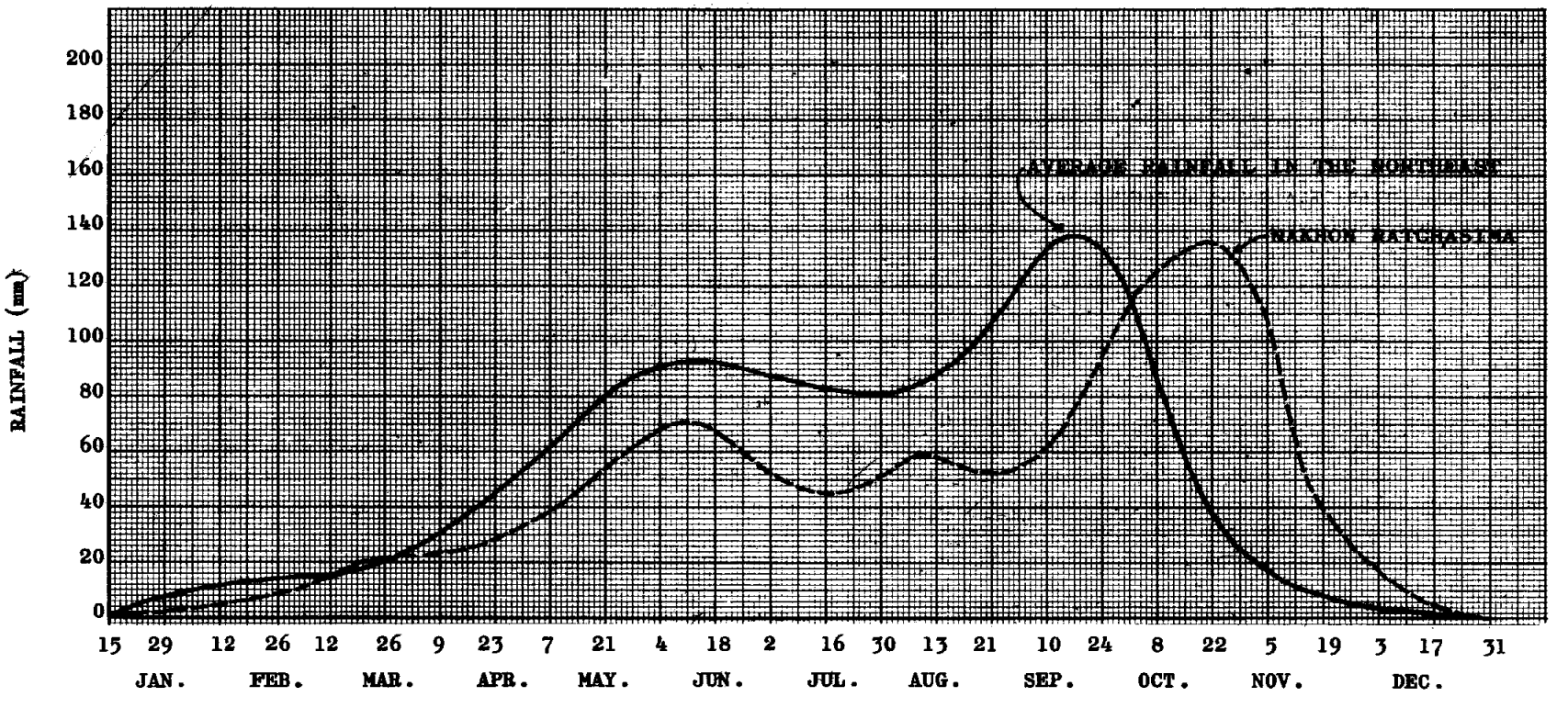

Source: "Seasonality and intensity of rainfall in north-eastern Thailand" by Frank G. Nicholls, Duurong Charoensook, Ittipon Padungchewit, Anuri Chintakananda, and Suparn Chamswasdi. Report No. 1 on Research Project 3/1 (Agricultural climatology of the north-eastern region: rainfall and evaporation) ASRCT unpublished report.

Figure 1. Seasonality of rainfall in north-eastern Thailand.

far as the resistance to dry spell and flooding is concerned, is known to be the early stage of development when the root system is not yet firmly and deeply established. It is, thus, commonly seen in the kenaf growing areas and in experimental plots that patches of young plants damaged by drought and flooding conditions are present. Loss of yield to a certain degree is undoubtedly unavoidable. The only remedy being employed is the implementation of reseeding practice.

The plants grown from such a practice are again subject to dry spell and flood, if any, as well as shading. They usually are not able to catch up in growth with the earlier grown plants.

Previous experience indicates that kenaf seedlings that are thinned out of the rows are able to resume growth if their roots are placed in contact with moist soil. It seems reasonable that transplanting of kenaf seedlings could be made instead of reseeding and that the transplanted seedlings could catch up in growth with the normal stands better than the young plants of the reseeding plots.

The present work is a comparative study examining the advantages of transplanting and reseeding practices on kenaf plants.

MATERIALS AND METHOD

An experiment employing a randomized complete block design replicated 5 times was conducted at the Non Sung Agricultural Experiment Station in 1969. Thai kenaf (Hibiscus sabdariffa var. altissima) variety Non Sung 001 was used. There were 7 treatments in each replication as follows:

	Date of operation			
	30 April	19 May	3 June	18 June
Transplanting	-	A_1	A_2	A_3
Reseeding	-	B_1	B_2	B_3
Control (normal)	C_1	$[C_2(=B_1)]$	$[C_3(=B_2)]$	-

The B_1 plot acts as reseeding treatment for the A_1, B_1, and C_1 group and at the same time acts as C_2 for the A_2, B_2, and C_2 group. Similarly,

B_2 acts as reseeding treatment for the A_2, B_2, and C_2 group and also acts as C_3 for the A_3, B_3, and C_3 group.

Each treatment has an area of 5 x 6 m. The experiment was performed on 30 April 1969 on which the first control plot was planted, whereas the first transplanting and reseeding treatments were made on 19 May. The transplanted seedlings were dug out from an extra plot, which was planted for this purpose on the same day as the control plot. The seedlings were spaced at 5 x 30 cm. The other two transplantings and reseedings were made on 3 June and 18 June. The seedlings transplanted in the latter two operations were from two extra plots planted 15 days in advance. Plant spacing in the control and reseeding plots were kept at 5 x 30 cm. Ammonium sulphate and double superphosphate were side-dressed at the rate of 4 kg N and 8 kg P_2O_5 per rai when the kenaf plants in the control and reseeding plots were about 20 cm high, whereas those in the transplanting plot were fertilized 7 days after the transplanting. Weedings were made when considered necessary. Harvest was done on 19 November, and the yield of fresh stalks and height of plants were measured.

RESULTS

The analysis of variance of fresh weight and plant height means showed highly significant differences.

Fresh weight

A_2 produced the highest yield, even though it was not significantly better than A_1, while A_1 gave statistically the same yield as C_1. And C_1 is not significantly better than A_3 and B_1, while A_3, B_1, B_2, C_2 and C_3 did not show any significant difference among each other. B_3 gave the lowest yield of fresh weight (Table 1).

Among A_1, B_1, and C_1 treatments, A_1 produced the highest fresh stalks, while B_1 the least. The C_1 gave lower yield than A_1, but both are statistically equal. Similarly, C_1 produced higher yield than B_1, but the difference is not significantly pronounced. Similar phenomena were present among the A_2, B_2, C_2 and A_3, B_3, C_3 groups, i.e., transplanting produced the highest yield and reseeding the least.

TABLE 1
FRESH WEIGHT OF KENAF
(in tonnes/rai)

Treatment	Replication					Total	Average [1/]
	1	2	3	4	5		
A_1	3.632	3.925	4.602	3.482	3.098	18.739	3.748 ab
A_2	3.818	4.261	5.045	3.296	3.354	19.774	3.955 a
A_3	3.498	2.981	3.536	2.149	3.034	15.198	3.040 cd
B_1	3.293	3.331	4.109	2.477	2.984	16.194	3.239 cd
B_2	3.282	2.877	3.482	2.266	2.522	14.429	2.886 d
B_3	2.299	2.576	2.981	1.989	1.989	11.834	2.367 e
C_1	3.594	3.936	4.256	2.197	2.992	16.975	3.395 bc
$C_2(=B_1)$	3.293	3.331	4.109	2.477	2.984	16.194	3.239 cd
$C_3(=B_2)$	3.282	2.877	3.482	2.266	2.522	14.429	2.886 d

[1/] Values of the same alphabet do not differ significantly by Duncan's new multiple range test at 5% level (Steel and Torrie 1960).

Plant height

Table 2 shows nearly the same pattern as that of fresh weight presented in Table 1. A_2, which produced the tallest plants, did not differ statistically from A_1, B_1, C_1, and C_2. Moreover, A_1, C_1, B_1, and C_2, which gave the same height of kenaf plants, did not differ significantly from A_3, B_2, and C_3. The shortest stalks were produced by the B_3 treatment.

Among A_1, B_1, and C_1 treatments, A_1 and C_1 gave the same height of kenaf stalks, but when compared with B_1 there was no statistical difference at all. A different phenomenon was present in the case of A_2, B_2 and C_2, of which A_2, the tallest, produced statistically the same height as C_2 but higher than B_2. But C_2 and B_2 did not differ significantly from each other. Among A_3, B_3, and C_3 treatments, C_3, the highest, produced kenaf plants of the same height as A_3, and both C_3 and A_3 were much taller than B_3.

TABLE 2
HEIGHT OF KENAF
(in cm)

Treatment	Replication					Total	Average [1/]
	1	2	3	4	5		
A_1	178.2	154.5	159.1	157.7	128.7	778.2	155.64 ab
A_2	199.6	159.4	166.7	135.1	146.1	806.9	161.38 a
A_3	165.4	141.1	139.2	123.1	138.2	707.0	141.40 b
B_1	162.9	154.0	162.9	122.7	141.5	744.0	148.80 ab
B_2	167.5	145.3	162.6	113.8	130.6	719.8	143.96 b
B_3	118.7	136.4	129.4	109.3	120.5	614.3	122.86 c
C_1	196.1	171.0	151.0	114.6	147.1	779.8	155.96 ab
$C_2(=B_1)$	162.9	154.0	162.9	122.7	141.5	744.0	148.80 ab
$C_3(=B_2)$	167.5	145.3	162.6	113.8	130.6	179.8	143.96 b

[1/] Values of the same alphabet do not differ significantly by Duncan's new multiple range test at 5% level (Steel and Torrie 1960).

DISCUSSION

An observation made in this laboratory in 1969 on the effect of digging and pulling out of kenaf seedlings from the seedbed on the root system and its recovery showed that root damage was considerable in the pulling method but was moderate in the digging method. A complete recovery of the root system was obtained about 5 days later in the case of the dug-out seedlings, whereas the pulled-out ones needed about 7 days for full recovery (Figure 2).

In all cases, the transplanted plot gave better yield than both the control and the reseeded plots (Figure 3). The difference is markedly visible in the second group of treatments (A_2, B_2, C_2). The first and the third groups show moderate and slight differences, respectively. Taking only the A and C treatments of every group into consideration, the A treatments should have not been better than the C treatments, since the kenaf plants in A plots were interrupted by transplanting operation, which is believed to withhold their growth for at least 5 days. The only possible explanation is that the transplanted plot has much better uniformity of seedling's height and spacing.

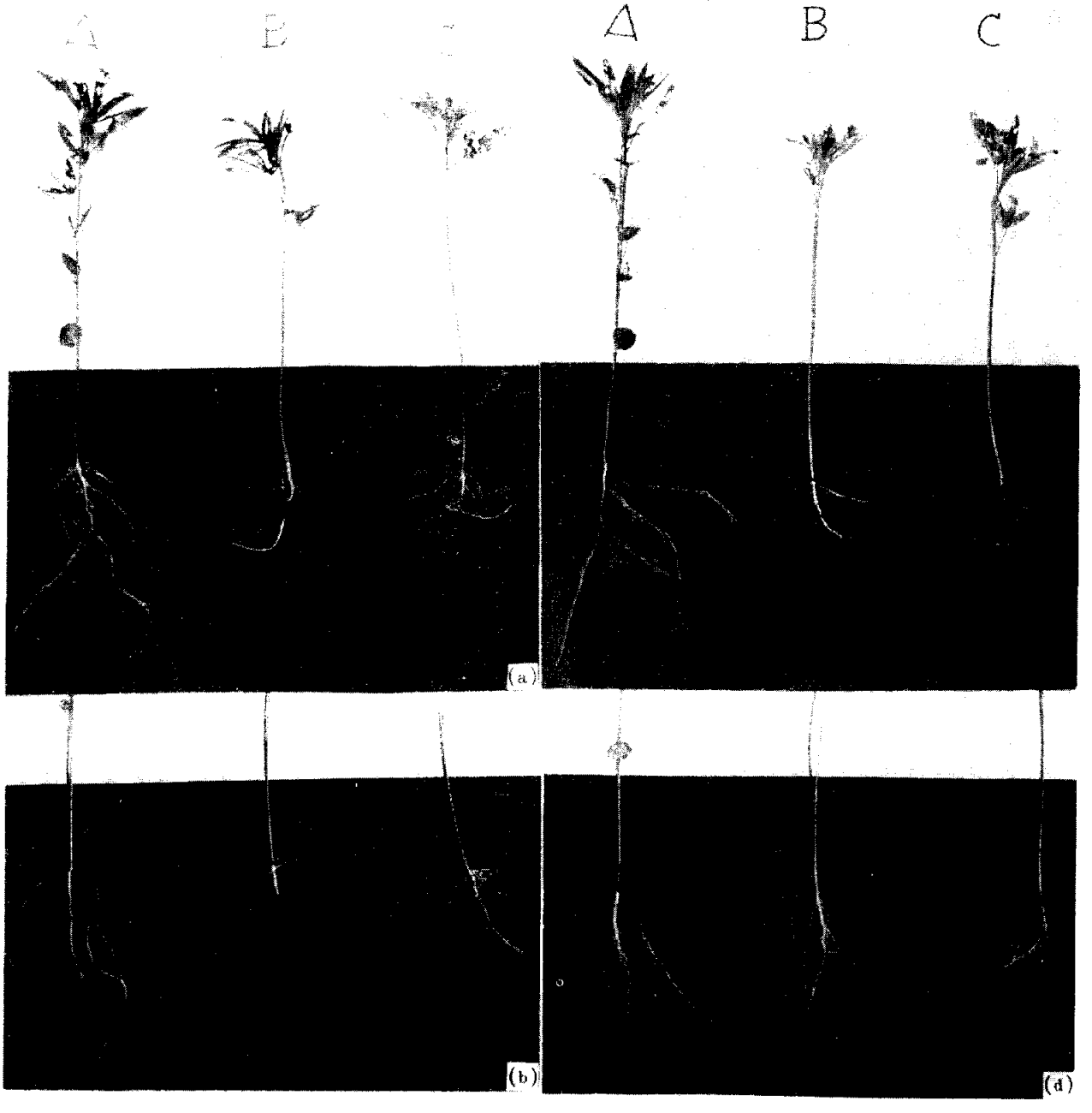

Figure 2. Root damage as caused by pulling out (B) and digging out (C) of kenaf seedlings as compared with the normal plant (A). (a), (b), (c), and (d) show the recovery of roots at 2, 4, 6, and 8 days later, respectively.

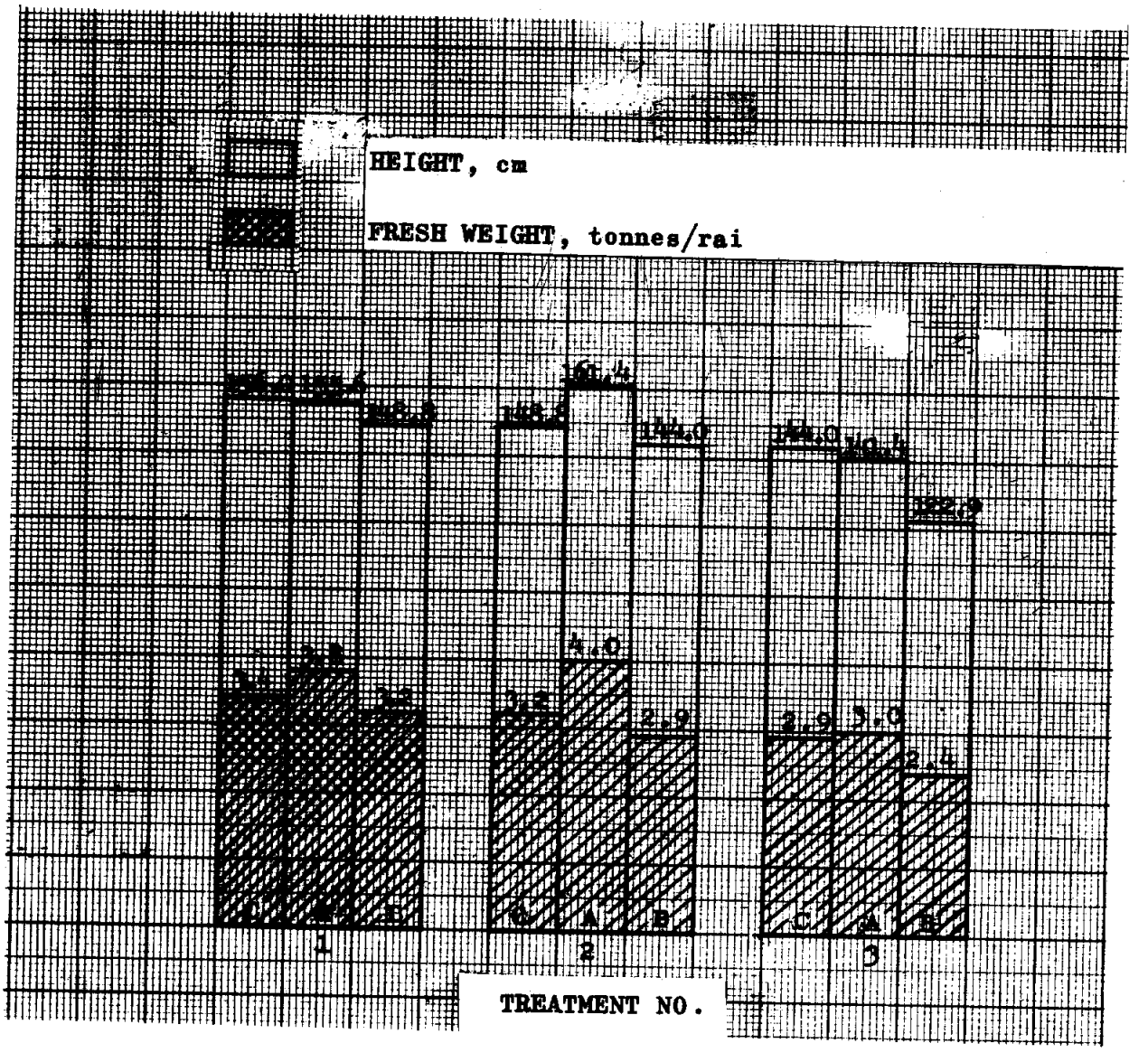

Figure 3. Histogram showing fresh weight and height of kenaf in various treatments.

The difference between the transplanting and reseeding practices is very marked. A definite conclusion is therefore drawn that transplanting is more advisable than reseeding, since the former makes use of the thinned out seedlings, which, with good root recovery and rapid growth, are able to catch up with the surrounding normal stands.

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