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Effects of bunch covering and bunch trimming on bananas in north Queensland

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Abstract

The effect on yield and fruit quality of polyethylene bunch covers applied one week after abscission of the last female flower bract was investigated with plant crop bananas in north Queensland. Bunch trimming by removal of the distal one or two hands of the bunch was investigated in conjunction with bunch covering in one experiment. In a second experiment the same bunch trimming treatments were applied in a ratoon crop without bunch covering treatments.

Bunch covering increased fruit weight per bunch by 4% and decreased the period from bunch emergence to harvest by 5 days. Bunch covering increased finger length of fruit at the proximal end of the bunch only.

Yield was reduced by 5% by trimming one hand per bunch in both experiments and by 15% and 13% by trimming two hands in Experiments 1 and 2 respectively. These yield declines occurred without an accompanying improvement in fruit grades. Thus bunch trimming was unprofitable in north Queensland.

INTRODUCTION

Polyethylene covers are applied to banana bunches soon after flowering in many banana producing countries. They are reported to increase bunch weight (Heenan 1973; Robinson and Nel 1984; Turner and Rippon 1973) and/or decrease the period from flowering until harvest (Heenan 1973; Perumal and Adam 1968; and Turner and Rippon 1973). The increase in bunch weight has been related to an increase in finger length (Robinson and Nel 1984). While the exact cause of increased finger length is uncertain, increases in temperature and relative humidity under covers (Daniells 1983; Robinson and Nel 1984) are probably the main contributing factors.

Bunch covers are applied in north Queensland to protect fruit from mechanical damage caused by leaf rub and during harvesting and transport to the packing shed. Covers also protect fruit from fungicide sprays applied to control leaf diseases and are thought to increase finger size and thus bunch weight. However, experimental results are lacking in north Queensland.

Bunch trimming is the removal of the distal one or two hands on banana bunches soon after flowering. Bunch trimming is practised in New South Wales to increase the length of fingers on the remaining hands and to obtain better prices for the longer fruit. Judging from the results of Akehurst (1975) and Stevenson (1977) further work is needed to confirm the profitability of bunch trimming. Boncato (1967), working in the Philippines,

found a significant decrease in bunch weight by bunch trimming. In Jamaica, Walker *et al.* (1974) also reported bunch weight losses from 8 to 19% by trimming the bottom two hands. In the low altitude areas of the Antilles, trimming increased the percentage of higher grade fruit but this benefit did not compensate for the reduction in total bunch weight (Meyer 1975) but at high altitudes (350 to 400 m) trimming of one hand was justified.

Our work was undertaken to determine the effect of bunch covering and bunch trimming on yield and fruit quality in tropical north Queensland.

MATERIALS AND METHODS

Experiments

Two experiments were carried out at South Johnstone, north Queensland (17° 38′S and elevation 18 m) on a deep alluvial clay loam.

Experiment 1 used a plant crop of bananas, *Musa* (AAA Group, Cavendish Subgroup) cv. Williams grown in double rows at a plant density of 2222 plants/ha. Plants with bunches that emerged from 8 April to 6 May 1980 were selected as sample plants. During the experiment side dressings of one tonne of dolomitic limestone per hectare, 36 kg P/ha as superphosphate, 51 kg N/ha as ammonium nitrate and K at 100 kg K/ha as potassium chloride were broadcast on the rows with a Vicon® mechanical fertiliser spreader. Dolomitic limestone and superphosphate were applied six monthly and ammonium nitrate and potassium chloride monthly. Paraquat was sprayed as required to control weeds. Trickle irrigation ensured that water was freely available to plants throughout their growth. Leaf spot caused by *Mycosphaerella musicola* Leach was controlled by the application of mancozeb and miscible oil at fortnightly intervals.

The experiment was a 5×2×3 factorial with five dates of bunch emergence (8 April 1980 and weekly thereafter), two bunch covering levels (covered and not covered) and three bunch trimming levels (0, 1 and 2 distal hands removed). Treatment combinations of the last two factors were allocated at random to eight plants within each of the five bunch emergence dates. Plants of a given emergence date were found in different places in the trial area and were not found in clusters. Treatments were applied after the last female flower bract had fallen and the fingers had begun to curl upwards.

Experiment 2 used a first ratoon crop during 1985. Sample plants were chosen from plants which flowered between 17 May and 4 June 1985. The management practice was the same as in Experiment 1 except that irrigation was provided by under-tree minisprinklers. Twenty plants were randomly allocated to each of the three treatments (0, 1 and 2 distal hands removed). There were no bunch covering treatments.

Measurements

Bunches were harvested when the diameter of the middle three fingers of the outer whorl of the third hand from the proximal end reached 38 mm on average in Experiment 1 and 37 mm in Experiment 2.

Fruit weight of each hand, finger number per bunch before and after treatment application and the average finger length of the middle three fingers of the outer whorl of each hand were determined in Experiment 1.

Bunch weight, finger number per bunch before and after treatment application, average length of fingers on the third hand and weight of extra-large and large fruit were recorded at harvest. On the basis of Daniells *et al.* (1985), fruit weight was calculated as 90% of

bunch weight. Extra-large fruit was defined as bananas longer than 216 mm, while large bananas were between 177 and including 216 mm in length, and the medium sized fruit between 140 and including 177 mm in length.

Statistical analyses

All measurements were subjected to an analysis of variance. The seventh hand finger length in Experiment 1 was analysed without the factor level '2 hands removed' and the eighth hand was analysed for banana bunches that had no hands removed. Additionally, the gradings in bunch weight of large and extra-large bananas and total bunch weight were linearly adjusted using an analysis of covariance for the number of fingers on the bunch that was counted before the treatments were applied (Daniells and Mulder 1986).

RESULTS AND DISCUSSION

There were no interactions between any of the three factors in Experiment 1 or between the two factors in Experiment 2. The effect of the date of bunch emergence was not significant for any of the characteristics measured except for bunch weight. The earlier was the date of bunch emergence the heavier was the bunch. Consequently, only the means for bunch covering and bunch trimming are presented.

Bunch covering reduced the duration from bunch emergence to harvest by 5 days (Table 1). Fruit weight per bunch was increased by 4% by covering. This was a function of increase in finger length (Figure 1). The finger length of the treatments '2 hands removed' and '1 hand removed' was not assessed for hand 8 since there were very few bunches in these treatments containing eight hands. For the same reason hand 7 of treatment '2 hands removed' was not assessed. Finger length of hands 1 to 4 (proximal end) was increased by bunch covering (Figure 1). This was presumably due to a greater temperature differential compared to distal hands which would have been closer to ambient air temperature because of greater air exchange towards the bottom of the cover. These results confirm the reports from elsewhere (Heenan 1973; Robinson and Nel 1984; Turner and Rippon 1973) of yield increases caused by bunch covering.

Table 1. Effect of bunch covering and bunch trimming on bunch weight and bunch characteristics

	Days from bunch emergence to harvest	Fruit weight per bunch (kg)*	Finger number per bunch	Average finger length third hand (mm)	Average weight of lare and extra-large fruit per bunch (kg)	
					large	extra-large
Experiment 1						
Bunch covering						
No covers	164*b*†	20.6*a*	109	262	1.4	19.2*a*
Bunch covers	159*a*	21.4*b*	107	267	1.1	20.3*b*
Bunch trimming						
0 hands removed	163	22.6*c*	121*c*	264	2.6*c*	19.9*b*
1 hand removed	162	21.1*b*	109*b*	265	1.0*b*	20.1*b*
2 hands removed	161	19.2*a*	94*a*	266	0.1*a*	19.2*a*
Experiment 2						
Bunch trimming						
0 hands removed	166	34.1*c*	190*c*	242	8.8*b*	21.0
1 hand removed	163	31.7*b*	179*b*	241	8.4*b*	20.0
2 hands removed	163	29.7*a*	161*a*	238	6.7*a*	20.0

* Covariance adjusted for initial finger number.

† Treatments within bunch covering or bunch trimming within an experiment with no letter or a letter in common do not differ ($P<0.05$).

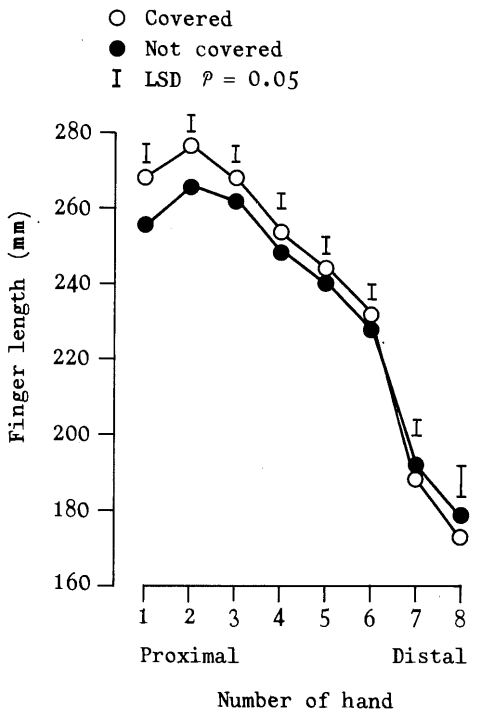

Figure 1. The effect of bunch covering on finger length on hand 1, (proximal end) to hand 8 (distal end) of the banana bunch.

Bunch trimming did not significantly affect the duration from bunch emergence to harvest in either experiment. In Experiment 1, the removal of one hand and two hands per bunch decreased the fruit weight per bunch by 7% and 15% respectively (Table 1). In Experiment 2, the removal of one hand and two hands per bunch decreased bunch weight by 7% and 13% respectively (Table 1). In both experiments there were no significant effects on finger length by trimming. There was also no increase in the average weight of extra-large fruit by trimming (Table 1).

Bunch trimming caused a yield decline without an accompanying improvement in fruit grades. Trimming was quite unprofitable without even considering the extra cost of labour. The literature cited earlier indicated that under conditions of lower temperature less favourable to bunch growth caused by high altitude or latitude, bunch trimming may be worthwhile. Bunch trimming may be applicable in north Queensland when the active leaf area is reduced by leaf spot, and for high density plantings both of which can reduce the rate of bunch growth. Other experiments would be necessary to confirm this.

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