BUNCH COVERS FOR BANANAS IN THE NORTHERN DISTRICT

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ABSTRACT

The effects of blue polyethylene bunch covers on Dwarf Cavendish and Giant Cavendish bananas were observed at Lejo Experimental Station in the Northern District over a period of seven months.

Covers consistently reduced the time between bunch emergence and bunch harvest for both Dwarf Cavendish and Giant Cavendish over the period of the trial. The reduction in time ranged from 4.3 *days to* 14.0 *days.*

The skin of fruit from covered bunches was significantly softer than that from uncovered bunches. There was only slight indication that yields of Dwarf Cavendish will be increased by using this type of cover, although figures were difficult to interpret due to inherent and monthly variations in Sigatoka severity.

Covered fruit in general were much more attractive, being free of skin blemishes caused by either insects, fungi, birds, and the abrasive action of leaves or spray

Covers were also very effective in protection against banana fruit fly (Strumeta musae) *infection. However regular inspections had to be made for damage to the cover by insects such as long horned crickets (unknown species of Family Gryllacrididae).*

Sunburning was also a problem and measures had to be taken to protect the top hands particularly when leaf canopy was reduced by Sigatoka leaf disease.

INTRODUCTION

Bunch covers for bananas were first used in parts of Eastern Australia during the winter months. Berril (1956) reported that bagging of bunches with hessian gave protection against chilling, sunburn and blemishes caused by windblown dust, birds, and the abrasive action of dead leaves. Berril (1956) also found that with plastic covers, bunch weight was increased by 10 per cent and that this was due to increased weight of individual fingers.

The advantage of increased yield with plastic bunch covers has also been noted by other workers (Rippon and Turner 1970, Cann 1965, Sampaio and Simao 1970). In New South Wales increases of up to 25 per cent were observed by Cann (1965) when covers were used during the winter, while Rippon and Turner (1970) found that blue polyethylene covers increased yields by 22 per cent when used during the spring-summer months.

Some workers have observed that covered bunches can be harvested earlier than uncovered bunches. Turner (1970) states that in commercial plantations in New South Wales covered bunches mature and are cut two to three weeks before uncovered fruit. Perumal and Adam (1968) found that bagging of Giant Cavendish bunches reduced the time to harvest by eight days when using perforated plastic bags and by 16 days if kraft paper bags were used.

Skin softness was another factor which was noted by Berril (1956) to change with the use of bunch covers. On the other hand Rippon and Turner (1970) found no difference in skin softness when using blue polyethylene sleeves applied during the summer in New South Wales.

Considering the beneficial effects reported from using bunch covers and also their role in preventing banana fruit fly (*Strumeta musae*) infection, it was decided to set up a trial to observe the effects of blue polyethylene covers on Cavendish bananas at Lejo Experiment Station in the Northern District.

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MATERIAL AND METHODS

Plants

Dwarf Cavendish and Giant Cavendish plants were selected at random from a mixed block, approximately 2/3 hectare in size and covers applied over a period of five months beginning in September 1972. The stools were approximately three years old and severely infected with Sigatoka leaf disease (*Cercospora musae*). Attempts to control the disease with fortnightly applications of mancozeb/white oil mixture were found to be only partly successful. The bananas were planted on a 3.6 × 3.6 metre spacing on a volcanic ash sandy loam soil.

Due to the variation in level of Sigatoka infection throughout the trial and to a drought during mid 1972, bunch weights and times for bunch maturity varied considerably from month to month and complicated interpretation of results.

Bunches were harvested when the fingers were round and full.

Yield figures for Giant Cavendish were not taken due to the relatively small number of this variety with bunch covers and the variability existing between stools.

Covers

Blue polyethylene sleeve covers were applied to bunches 1-2 weeks after emergence. It was found necessary to wait until bracts had dried or partially dried so that they could be easily removed before applying the cover. If bracts were retained inside the cover, staining of the fruit usually resulted. To complete the protection against banana fruit fly (*Strumeta musae*) covers were tied off under the bunch leaving a small channel to drain condensed liquid from inside the cover. This was done about two weeks after the covers were applied and bunches had fully elongated. Bells were removed.

Sunburning especially of the top two hands was a problem and this was only partially offset by inserting the flag leaf inside the cover. Generally speaking the greater the Sigatoka infection the greater the incidence of sunburn.

Another problem which arose with the covers was the damage caused by the long horned cricket (unknown species of Family Gryllacrididae) which chewed holes through the cover. As holes were noticed they were patched up.

Skin Softness

Skin softness was measured by the amount of pressure which had to be applied to a 3-inch nail in order for it to break through the skin. The nail was attached to the end of a length of pine (30 cm long) which was pivoted in the middle of its length. Pressure was applied at the other end by a 100 gm spring balance. The same equipment was used for all measurements taken over the December-March period. The end of the nail was cleaned after each set of readings to avoid possible corrosion.

Three fingers were randomly chosen from each bunch immediately after harvest. Only firm green fingers were used and obvious soft spots and other forms of skin blemishes avoided. At least twenty sites were chosen on each finger and the readings averaged out. The average of the three fingers was then found, to give a reading for the bunch. Eight bunches from each treatment were sampled in this way.

RESULTS AND DISCUSSION

Figure 1 (p. h) illustrates the monthly rainfall variation throughout the trial. As the block was not irrigated during the dry months of July-August-September 1972 reductions in growth rate occurred (Heenan, unpublished data 1973).

Bunch Emergence—Harvest

Table 1 indicates that bunch covers do have an effect on decreasing the time required for bunch maturity by an average of eight days.

An analysis of variance showed that the effect of bunch covers was very highly significant and that there was no significant difference between varieties or between months of maturity in the response to bunch covers.

The results in general agree with the findings of other workers (Perumal and Adam 1968, Turner 1970, Berril 1956) who found that bunch covers accelerate development of bananas by about a week.

The decreasing time for maturity from December, 1972 to April, 1973 (*Table* 1)

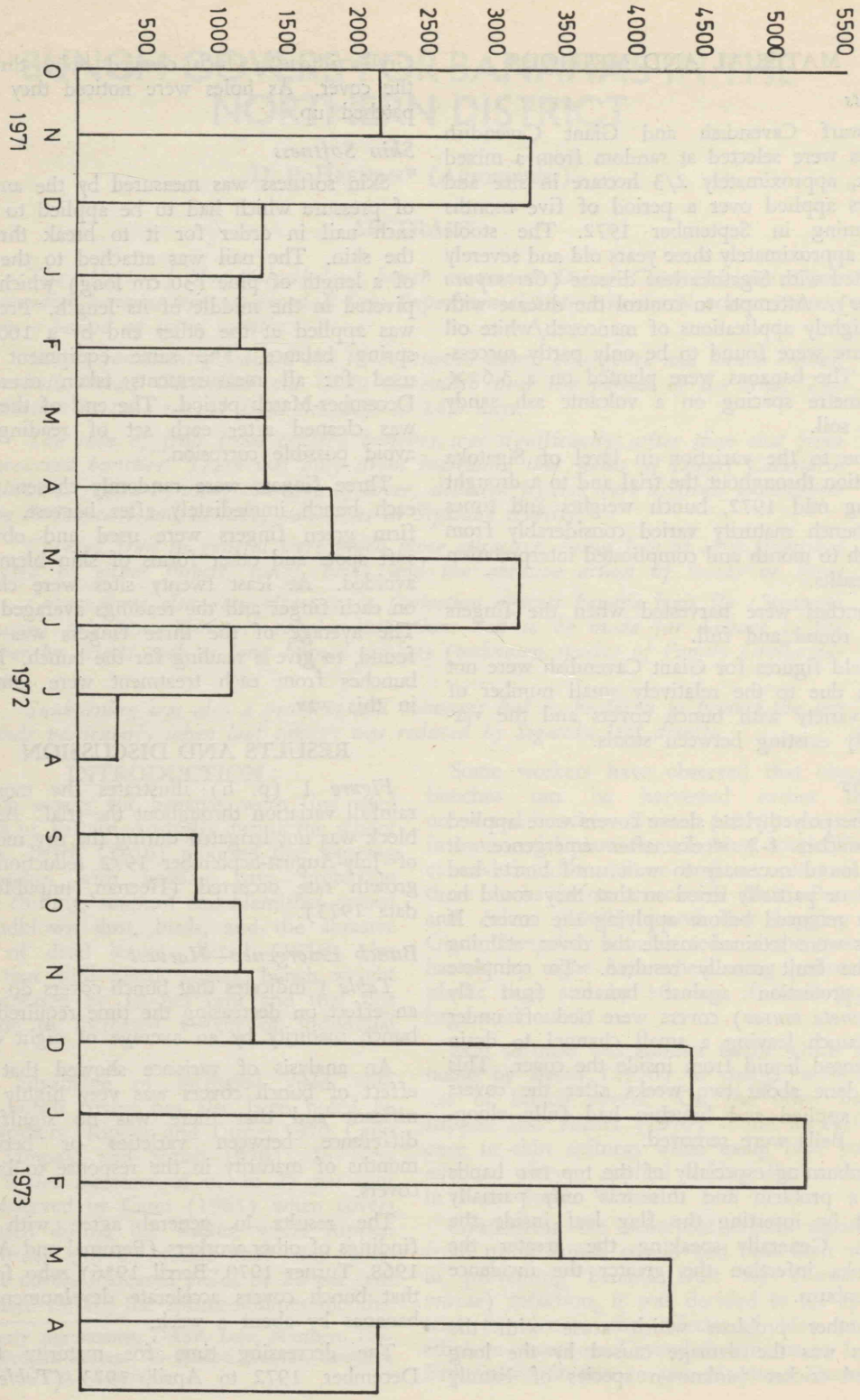

Figure 1.—Monthly Rainfall variations.
Rainfall in (mm)

could be due to indirect effects of the drought during 1972 (*Figure* 1). Periods of water stress are reported to reduce physiological activity of bananas (Turner 1972). It is therefore quite possible that the dry period could have influenced physiological activity of the young bunches at that time thus delaying their development and resulting in longer times to reach harvest. Bunches harvested in the latter part of the trial would have been less influenced by this dry spell.

Yields

Average weights of bunches harvested, classified according to numbers of hands per bunch and time of harvest, are summarized in *Table* 2. There were variable numbers of bunches in each class.

Table 1.—Effect of bagging of Dwarf Cavendish and Giant Cavendish bunches on the number of days from bunch emergence to harvest

Month of harvest	Time interval (days) between bunch emergence and harvest			
	Dwarf Cavendish		Giant Cavendish	
	Uncovered	Covered	Uncovered	Covered
December	110	102.5	109.8	105.5
January	104	92.6	103.8	95
February	98	91	101.8	88
March	97.3	83.3	90.5	82
April	89.3	82.4	90.3	86.3

Table 2.—Effect of covers on the weight of Dwarf Cavendish bunches of varying size

	Bunch Wt. (Kgms)					
	− Bunch Cover			+ Bunch Cover		
	9 hands	10 hands	11 hands	9 hands	10 hands	11 hands
Dec.-Jan.	21.9	23.9	25	25.85	26.75	32.3
Mar.-April	27.1	27.2	33.5	26.1	29.75	31.3
May-June	21.8	24.8	25.5	25.2	24.1	

Analysis of variance showed a significant increase in weight of covered bunches but the weighted mean increase was only 1.8 kg per bunch. There was some visual evidence that individual fingers from covered bunches were fuller than fingers from uncovered bunches.

It appears that the effect of covers on bunch weights may be small in the inner tropics. Although Rippon and Turner (1970) observed increases of 22 per cent during the spring-summer months in New South Wales, Sampaio and Simao (1970) recorded non significant increases of only 1.37 kg per bunch on Dwarf Cavendish bananas in Brazil. The type of cover used was blue polyethylene in both cases. An increase of 10 per cent was recorded by Berril (1956) in southern Queensland using plastic sleeve covers. However this was found during the winter months. It is highly likely that lower temperatures (and humidities) were reached during the trial conducted by Rippon and Turner (1970) than at Lejo.

Skin Softness

Bunch covers significantly softened the skin of both Dwarf Cavendish and Giant Cavendish. The effect of the cover on the skin appears to be more pronounced with Giant Cavendish, reducing the amount of pressure required to break the skin by 162.8 gm or 31 per cent. The reduction obtained for Dwarf Cavendish was 69.2 gm or 18.3 per cent.

The results obtained agree with those obtained by Berril (1956) but not by Turner (1970). Turner used a similar type of cover to those used in the present trial but his method of determining skin softness is not known and no figures were given.

Table 3.—Effect of bunch covers on skin tenderness as measured by the pressure (in grams) which has to be applied to force a 3" nail through the skin of Dwarf Cavendish and Giant Cavendish bananas

Variety	Pressure (gms)	
	− Bunch Cover	+ Bunch Cover
Dwarf Cavendish	376.9	307.7*
Giant Cavendish	520	357.39**

* Significant at P= .01
** Significant at P= .001

The economic importance of this reduction in skin toughness would become most apparent during transport of the bananas. Covered bunches would not only be more susceptible to bruising but also to sunburn. Berril (1956) recommends that it is best to leave the cover on after harvest and bring the bunch under a shed. The cover can then be removed after twenty-four hours. The author's own observations in the field indicated that fruit were more susceptible to sunburn than uncovered fruit, after the covers had been removed.

The apparent difference between varieties was significant at the 1 per cent level indicating that fruit skin of Giant Cavendish is harder to penetrate than skin of Dwarf Cavendish fruit.

Other Observations

External appearance of covered fruit was in general more attractive than uncovered fruit. The skin was usually a clearer golden green colour free of any marks from insects, disease or abrasive action of dead leaves.

It was noted that the later the stage of application of the cover the greater was the damage by russeting agents causing brownish discolourations on the skin. This was also the opinion of Lachenaud (1972) who found that covers were best applied at a very early date (lifting of first bract) to control banana rust thrip (*Chaelanaphathrips orchedii*)

Covers appeared to have little effect on taste or eveness of ripening.

Sunburn effects were in some cases severe particularly where Sigatoka leaf spot had largely reduced the number of leaves, leaving the bunches exposed. The topmost hands were usually the only ones affected. Sunburn was reduced to a certain degree by folding the last emerged leaf inside the cover and over the top hands. A single sheet of newspaper was tried by Turner (1970) who reported not only partial protection from sunburn but further increases in yield.

Complete fruit fly control was obtained when bunch covers were tied off at the bottom leaving a small hole to drain condensed liquid. Although sleeve covers resulted in some reduction in infection they could not be regarded as a commercial form of control of fruit fly unless the bottom is secured.

CONCLUSION

Results indicate that bunch covers do decrease the time required for bunches to mature, soften the fruit skin and develop a more "attractive" looking fruit. Increases in bunch weight were significant in only one case and overall results were too variable to form a true picture of the effects of bunch covers on yields.

Reasons for the changes brought about by the bunch covers are not clear. The warmer air trapped inside the bag could play a major role in decreasing the time required for bunch maturity as suggested by Perumal and Adam (1968). The high humidity as well as the high temperatures developed inside the bags would no doubt have affected the tenderness of the skin. It is possible that perforated covers will reduce softening of the skin by reducing the high humidity inside the cover.

The physical protection against banana fruit fly and other agents causing fruit blemishes was effected as long as the cover was complete. Damage by the long horned crickets can be quite extensive and would require some form of control and continual checking of the covers.

Blue polyethylene covers secured at the bottom of the bunch do impose some inconvenience in determining the state of maturity of the fruit for harvest and covered bunches require a closer inspection than uncovered bunches.

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