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EFFECT OF DEFOLIATION ON GRADE OF COTTON LINT

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SUMMARY

Generally, little grade improvement resulted from chemical defoliation. Colour was improved by removal of a leaf staining where soft leaf was present. Desiccation may reduce grade unless the crop is harvested soon after application. When at least 60% of the crop was open, no yield reduction occurred. Fineness, strength and staple length were likewise unaffected.

I. INTRODUCTION

Chemical defoliation is used extensively in all cotton-growing areas in Australia as an aid to harvesting. This is based largely on the belief that leaf removal will lower trash content in harvested seed cotton and will therefore improve grade of lint. Some controversy exists on this. For example, La Ferney, Mullikin and Chapman (1965) suggested that a higher grade is obtained by defoliation, while McMeans, Walhood and Carter (1966) cited cases where trash content was not affected by defoliation. Desiccation of leaves is not commonly practised. Addicott and Lynch (1957) quoted reductions in leaf staining but sizeable increases in trash content. Considerable work has been done on the effects of harvest aid chemicals on yield and lint characteristics and it is accepted that production and quality are not affected provided application is not made too early.

The effect of defoliation and to some extent desiccation on the commercial grade of cotton was examined in four trials in Central Queensland from 1962 to 1964. Response was studied over a range of varieties and conditions.

II. MATERIALS AND METHODS

Operations were carried out on a fully replicated field scale using long (at least 700 ft) plots exceeding 0.4 ac. Applications of chemical were made by ground rig at 30 gal/ac. Cotton was harvested by conventional tapered spindle machines and either bulk-trucked or sent as bales to a ginnery for grading and processing.

Two true defoliant—“DEF” (72% w/v S,S,S-tributyl phosphorotrithioate) and “Folex” (71.2% w/v S,S,S-tributyl phosphorotrithioate)—and one desiccant, “Diquat” (20% w/v 9, 10-dihydro-8a, 10a-diazoniaphenanthrene), were compared in two trials. In the other two DEF only was employed by application to several varieties. DEF and Folex were applied at 1½ pt of commercial product per acre and Diquat at 1 pt of commercial product per acre.

Yields are recorded on 10% moisture, nil trash basis. In trials 1 and 2, lint grade and staple and percentage trash were recorded. In trials 3 and 4, numerical scores were given for lint grade on the basis of both colour and trash content (SLM = 80 to 90, M = 90 to 100, SM = 100 to 110).

III. RESULTS

In all cases both DEF and Folex caused loss of leaf in its green state and little desiccated leaf was present at harvest, while Diquat produced complete desiccation within 5 days.

Tables 1–3 list the results obtained. Yield was not significantly affected by defoliation or desiccation in any trial.

In trials 1 and 2 (Table 1), the defoliation treatments reduced the amount of leaf trash in the sample on three out of four occasions, but did not improve grade in this character. It did, however, remove some leaf staining, particularly in trial 1, where leaf was soft. The desiccation treatment produced seed cotton slightly higher in trash content than the undefoliated treatment. This caused a serious drop in grade from this character in the second trial, but not in the first trial. This was due to a difference in dry leaf condition at harvest. In trial 2, leaf was very dry and brittle and broke up into pin trash in cleaning. In trial 1, leaf was in large pieces which did not break up and these were more easily removed. This effect was heightened by the slightly more hairy leaf in the Empire variety used in trial 2.

Defoliation had no effect on lint trash content or on lint colour in trial 3 (Table 2). It therefore did not affect grade. Defoliation did not affect staple length, fineness or strength of the fibres. Although there were significant varietal yield differences (Deltapine Smoothleaf and Dixie King significantly outyielded the other varieties), defoliation in itself did not affect yield.

In trial 4 (Table 3), defoliation raised the potential grade of Deltapine Smoothleaf by a full grade due to reduction in leaf trash in the lint, but this grade was not commercially possible because of the lint colour. Dixie King was not affected in this way. Yields were not taken in this trial.

It is concluded that defoliation may sometimes improve grade slightly by reducing the leaf trash content of lint. This effect appears to be sporadic, however, and generally speaking little effect on cotton grade is achieved. Some advantage may also occur in leaf colour by the removal of leaf staining, particularly where heavy soft leaf is present. Defoliation at this time, however, is poor. Desiccation can reduce grade if the leaves are allowed to dry so that they crumble easily to produce pin trash in cleaned lint. This indicates that desiccants may have a place in certain circumstances so long as the crop is harvested very soon after treatment. In all trials, at least 60% of the crop was open. At this stage no yield reduction occurred. Fineness, strength and staple length were not affected.

TABLE 1
RESULTS OF TRIALS 1 AND 2

Trial No.	Treatment	Leaf Drop (%)	Yield (lb s.c./ac)	Leaf Trash (%)	Lint	
					Grade	Length (in.)
<i>Trial 1</i>						
(Miller 43—9—0)	Folex	60	829	5.4	M	1 1/32
60% open, leafy, lodged ..	DEF	60	865	4.8	M	1 1/32
Harvest after 13 days	Diquat	20	838	6.6	M	1 1/32
	Undef.	..	819	6.2	MLS	1 1/32
<i>Trial 2</i>						
(Empire)	Folex	90	1,968	4.9	SLM	1 1/32
80% open, "cut-out"	DEF	90	1,916	6.0	SLM	1 1/32
Harvest after 17 days	Diquat	20	1,879	6.9	LM	1 1/32
	Undef.	..	1,925	6.0	SLMLS	1 1/32

TABLE 2
RESULTS OF TRIAL 3

	Miller		Empire		Mexico Acala		Dixie King		Deltapine SL	
	Def.	Undef.	Def.	Undef.	Def.	Undef.	Def.	Undef.	Def.	Undef.
Grade	MLS	MLS	SLM	SLM	MLS	MLS	SLM	SLM	MLS	MLS
Lint Colour	92	92	90	88	93	92	89	89	92	92
Lint trash	98	98	84	85	98	98	87	87	98	98
Staple length (inches) ..	31/32	31/32	1	1-1/32	31/32	31/32	1	1	1	1
Micronaire	5.05	5.07	4.22	4.35	4.52	4.57	4.47	4.45	4.55	4.52
Pressley ('000 psi) ..	72.70	72.93	76.40	76.16	77.82	76.89	78.57	80.55	75.10	75.71
Yield (lb s.c./acre) ..	1,420	1,414	1,369	1,428	1,322	1,344	1,543	1,539	1,538	1,589

70% open, leafy, harvested after 13 days with 60% leaf drop.

TABLE 3
RESULTS OF TRIAL 4

	Grade	Length (in.)	Lint Colour	Lint Trash
Deltapine SL defoliated ..	M	1 1/16	98	105
Deltapine SL undefoliated ..	M	1 1/16	98	95
Dixie King defoliated	SLM +	1 1/16	97	89
Dixie King undefoliated ..	SLM +	1 1/16	96	88

80% open, cut-out, harvested after 9 days with 90% leaf drop.

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