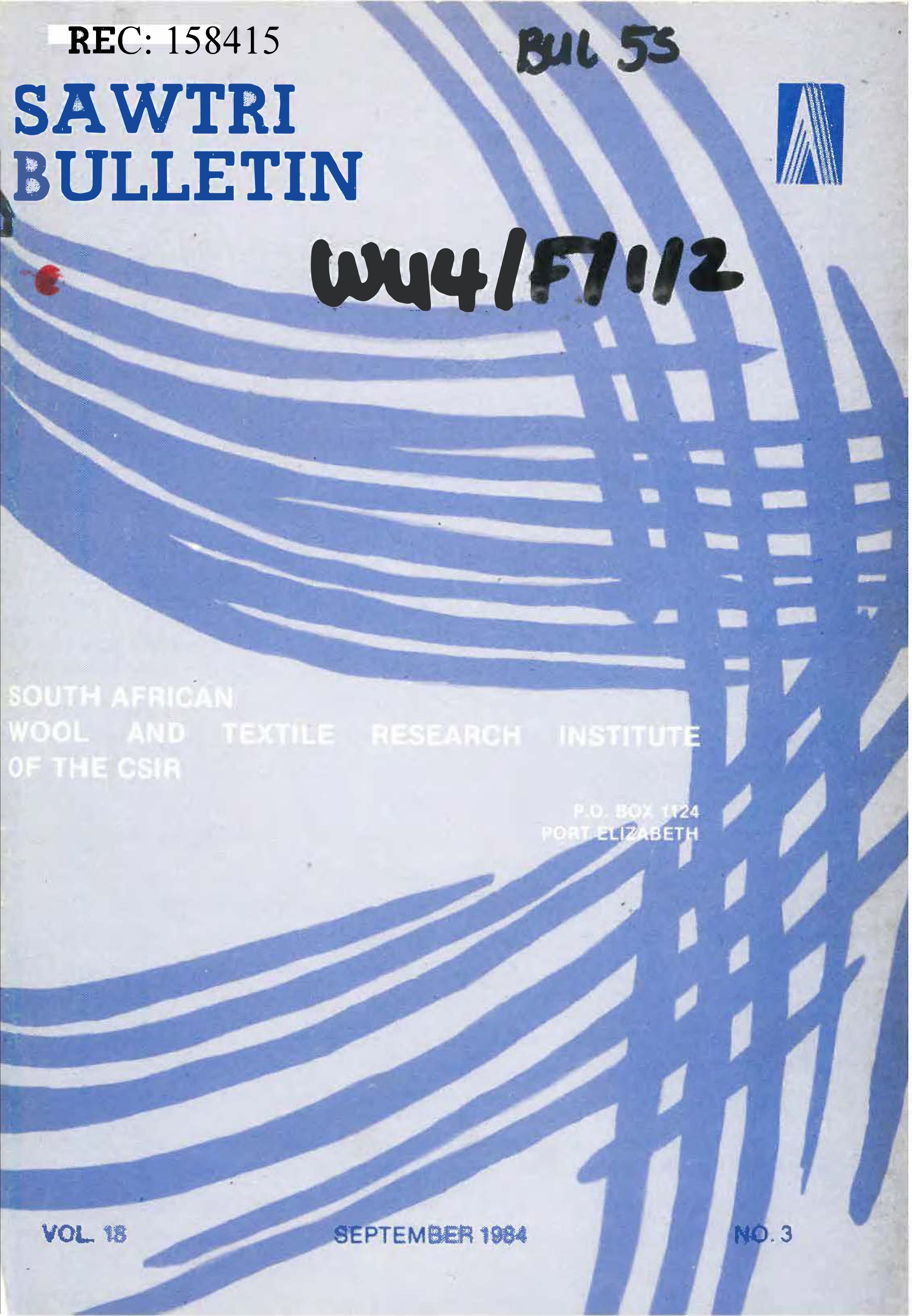
SAWTRI BULLETIN



SOUTH AFRICAN
WOOL AND TEXTILE RESEARCH INSTITUTE
OF THE CSIR

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INSTITUTE NEWS

SAWTRI Shrinkresist Process Patented

As previously advised SAWTRI has developed a new shrinkresist process for wooltop and we are now able to announce that South African Patent No. 83/6132 covering the process was granted on March 6th, 1984.

Meeting of Working Groups at SAWTRI

The third annual meeting of Working Groups representing the South African Wool & Mohair Processors Association, South African Worsted Manufacturers' Trade Association (SAWMTA) and the South African Cotton Textile Manufacturers' Association (SACTMA) took place at the Institute during September to discuss proposals for the 1985/86 Research Programme to be conducted at SAWTRI.

Visitors to SAWTRI

Considerable interest has been generated internationally in SAWTRI's recent development of an instrument to measure the staple length and strength characteristics of raw wool. Visitors received in this regard were Mr Phil Irvine, a research scientist from CSIRO, Ryde, Sydney, on the 26th June, and Mr David Ward, Managing Director of the Australian Wool Testing Authority, Melbourne, on the 21st August.

SAWMTA/SAWTRI Working Group meeting in session.

From left to right: Mr J Cizek, Head of Machine Development and Innovation; Dr D W F Turpie, Chief Director and Mr Phil Irvine from CSIRO; looking at the electronic display of the SAWTRI Length/Strength Tester.

Mr David Ward, Managing Director of the Australian Testing Authority and Mr Jan Becker, Director Technical Services of the South African Wool Board, during Mr Ward's visit to Port Elizabeth.

Mr E Gee, Chairman of the Eastern Cape Branch of the Textile Institute, in conversation with Dr G H Crawshaw in the Eastern Cape Office of the TI.

On July 13th the Eastern Cape Section of the Textile Institute received Dr G H Crawshaw, Manager, Non-Apparel, at IWS, Ilkley, who gave an interesting talk on the subject "New Developments in Bedding". Dr Crawshaw also devoted some time to discussing the publishing policy of the Textile Institute in his new capacity as joint editor of the 'Journal of the Textile Institute' and consulting editor of 'Textile Horizons'.

On August 28th, a study group of 18 wool farmers from the Adelaide district were taken through the processing departments at SAWTRI, and on the 4th September 25 pupils from Patensie were given a short slide show followed by a conducted tour through certain sections of the Institute.

On September 6th, Mr S Kaji, Manager of the Wool Department at Kanematsu-Gosho Ltd, Osaka, Japan, visited SA WTRI to familiarize himself with the facilities and research being done at the Institute.

Mr Bernard Verstraete of Messrs Phildar, Roubaix, France, members of the International Mohair Association, visited the Institute during September to have discussions on matters relating to mohair.

On September 11th, 47 students of the Grootfontein Agricultural College visited the Institute with the view of gaining information on the different processing procedures and its implications in their prospective careers related to agriculture.

A NOTE ON THE EFFECT OF METHOD AND TIME OF HARVESTING ON COTTON FIBRE PROPERTIES

by K W Sanderson and E Gee

ABSTRACT

Data on the physical properties of a large number of cotton samples covering three seasons, various cultivars, different production areas and various harvesting régimes were analysed to obtain information on the effects of picking method and time of harvesting on fibre properties. Although differences were apparent from year to year, there was an absence of any well-defined overall patterns in physical properties, other than the larger trash content of machine-picked cotton.

INTRODUCTION

The fibre properties of any lot of cotton are influenced by a wide range of genetic, production, environmental, harvesting and processing factors[1] (see Fig. 1). The various phases of the cotton production and processing route, however, interact and are related and it is often difficult to single out specific factors which are most influential in determining final fibre quality. Naturally, the genetic make-up of a cultivar is the initial and major factor but there are many other important factors. Mechanical picking and ginning are known[2] to be detrimental to inherent fibre properties, particularly when intensive drying and cleaning are required. In certain circumstances, other factors may also be important, for example, stressed growing conditions, brought on either by adverse weather conditions during part of the season or by poor management.

During the harvesting phase, the method of picking can have a significant effect on both grade and fibre quality. The grade of machine-picked cotton is often inferior to hand-picked cotton due to its higher trash content, different trash characteristics and poorer colour[3]. Fibre length and length uniformity may also be reduced, although this may be attributed more correctly to the necessarily harsher ginning conditions. However, it has also been reported that the quality of cotton, other than trash content, is not impaired by machine picking[4].

It has also been reported[5,6,7] that stripper pickers tend to reduce the fibre quality of raw cotton only slightly less than spindle pickers.

A most important defect of machine-picking, however, is the unavoidable increase in lack of uniformity of fibre properties due to the collective harvesting and admixture of earlier-matured bolls with later-matured bolls[2]. Thus, as the number of pickings is reduced, so each picking will contain a

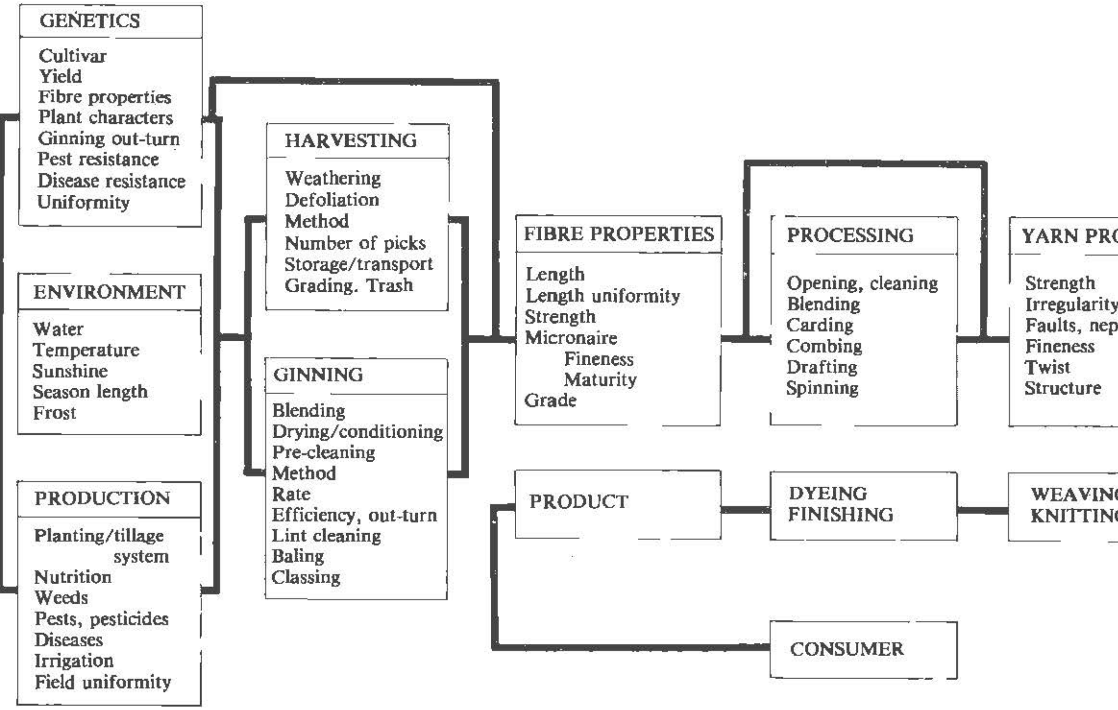

FIG. 1: THE COTTON ROUTE

greater range of fibre qualities[8]. This effect has been illustrated by a number of authors[5,8,9,10] who also showed that the earliest matured, or first-harvested, bolls produced the best quality fibre and that fibre quality tended to deteriorate with delays in harvesting. Progressive weathering of fibres in the open boll, and consequent reduction of fibre quality especially fibre strength, was reported by Basinski[11] and was mentioned by Crabtree[8]. On the other hand, Garner[12] found that basic physical properties (micronaire, length and fibre strength) changed very little with harvest date. In another case, the response of cultivar to variations in temperature masked harvest differences[13]. In some circumstances, some fibre properties are more affected by environmental and growing conditions than by time of harvesting[14]. Meredith[10] added, however, that cultivar was the most important source of overall variability.

During the three seasons, 1977, 1978 and 1979, some 2 400 cotton samples, representing a cross-section of the cotton crop grown in South Africa, were collected during grading. The fibre properties of these cottons were measured at SAWTRI and typical values were published, first for the various cotton classes[15] and then for the more commonly occurring cultivars[16]. Subsequently, with the availability of more detailed descriptions of the samples from all three years, the data have been further analysed comparing methods of picking (machine-picked and hand-picked) and times of harvesting (early and late). The work is reported in this paper.

EXPERIMENTAL

Representative bale samples (500 g) of cotton lint were drawn during grading of the 1977, 1978 and 1979 cotton crops and were tested at SAWTRI. A wide range of cultivars was included. Standard fibre property tests were conducted on each sample using normal procedures.

Fibre perimeter and standard fineness (a useful comparative measure of fineness assuming unity maturity) were calculated using the following formulae:

Standard fineness (mtex), Hs = Actual fineness (mtex)/maturity ratio

Fibre perimeter (μm) = 3,8 $(\mathrm{Hs})^{1/2}$.

The results were grouped and averaged by method of picking (machine or hand) and time of harvesting (early or late) for each year and each cultivar.

RESULTS AND DISCUSSION

The results, which are given in Tables 1, 2 and 3 are for those cultivars for which there were sufficient samples to allow useful analysis. Means and standard deviations were calculated and significant differences were assessed (using $p = 0{,}05$ or the 95% significance level).

ABLE 1: AVERAGE COTTON FIBRE PROPERTY VALUES COMPARING METH
PICKING AND TIMES OF HARVESTING: 1977

Method of picking (M = Machine picked; H = Hand picked)

ultivar	2,5% Span Length (mm)		50% Span Length (mm)		Pressley (1000 psi)		Micron-aire		Maturity ratio		Fineness (mtex)		Perimeter (µm)		Standard Fineness (Hs)	
	M	H	M	H	M	H	M	H	M	H	M	H	M	H	M	H
cala	28,6	28,6	**12,7**	**13,1**	91,4	91,7	3,62	3,66	0,87	0,86	**151**	**154**	**50,1**	**50,8**	**174**	**179**
lbar	27,0	27,0	12,4	12,4	83,2	87,0	3,71	3,72	0,88	0,88	153	162	48,0	51,6	174	185
S2	**26,7**	**27,9**	**12,0**	**12,6**	**79,3**	**85,3**	**3,62**	**4,01**	0,84	0,81	**156**	**182**	**51,9**	**56,9**	**187**	**225**
eltapine	**26,0**	**26,4**	**12,2**	**12,4**	**75,7**	**80,9**	**3,68**	**4,15**	0,83	0,87	**161**	**182**	**53,0**	**54,6**	**195**	**207**
lean	27,1	27,5	12,3	12,6	82,4	86,2	3,66	3,89	0,86	0,86	155	170	50,8	53,5	183	199

Time of Harvesting (E = Early; M = Mid; L = Late)

ultivar	2,5% Span Length (mm)			50% Span Length (mm)			Pressly (1000 psi)			Micron-aire			Maturity ratio			Fineness (mtex)			Perimeter (µm)			Standard Fineness (Hs)		
	E	M	L	E	M	L	E	M	L	E	M	L	E	M	L	E	M	L	E	M	L	E	M	L
cala	**29,0**	**28,6**	**27,7**	**13,2**	**12,9**	**12,6**	**92,9**	**92,1**	**87,3**	**3,80**	**3,61**	**3,28**	**0,88**	**0,86**	**0,84**	**161**	**151**	**137**	**51,5**	**50,4**	**48,4**	**184**	**177**	**162**
lbar	27,2	26,8	26,9	12,4	12,3	12,6	87,0	83,7	86,7	3,90	3,81	3,70	**0,88**	**0,85**	**0,91**	163	164	148	**51,6**	**52,8**	**48,4**	**185**	**193**	**163**
S2	**27,6**	**26,6**	**26,5**	12,6	12,4	12,2	**84,0**	**86,5**	**81,0**	3,98	3,88	3,77	**0,82**	**0,77**	**0,84**	**178**	**183**	**164**	**55,9**	**58,5**	**52,8**	**217**	**238**	**195**
eltapine	**26,6**	**26,1**	**25,9**	12,2	12,3	12,2	**79,8**	**79,7**	**78,5**	3,99	4,10	3,98	0,86	0,85	0,86	**172**	**180**	**171**	**53,6**	**53,4**	**53,2**	**199**	**213**	**197**
lean	27,6	27,0	26,8	12,6	12,5	12,4	85,9	85,5	83,4	3,92	3,85	3,68	0,86	0,83	0,86	168	170	155	53,2	53,8	50,7	196	205	179

;ures in bold type indicate significant differences (P = 0,05) within cultivars: M vs H and E vs M vs L

BLE 2: AVERAGE COTTON FIBRE PROPERTY VALUES COMPARING METH PICKING AND TIMES OF HARVESTING: 1978

Method of picking (M = Machine picked; H = Hand picked)

ti v	2,5% Span Length (mm)		50% Span Length (mm)		Pressley (1000 psi)		Micron-aire		Maturity ratio		Fineness (mtex)		Perimeter (µm)		Stand Fineness (Hs	
a	M	H	M	H	M	H	M	H	M	H	M	H	M	H	M	H
ltapine	**26,7**	**27,1**	12,2	12,8	**74**	**77**	**3,80**	**4,12**	**0,84**	**0,90**	**165**	**172**	53,2	52,6	196	1
ala 1517/70	**28,7**	**28,2**	12,7	12,9	90	89	3,76	3,70	**0,93**	**0,89**	**145**	**151**	**47,4**	**49,6**	156	9
b	**27,3**	**26,7**	12,4	12,3	**82**	**85**	3,67	3,69	0,87	0,88	153	153	50,4	50,0	176	7
a	**27,7**	27,5	12,5	12,5	**82**	**86**	**3,50**	**3,66**	0,85	0,87	**147**	**152**	49,9	50,2	172	0
a	27,6	27,4	12,5	12,6	82	84	3,68	3,79	0,87	0,89	153	157	50,2	50,6	175	3

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Time of harvesting (E = Early; L = Late).

t i	2,5% Span Length (mm)		50% Span Length (mm)		Pressley (1000 psi)		Micron-aire		Maturity ratio		Fineness (mtex)		Perimeter (µm)		Stand Fineness (Hs)	
v	E	L	E	L	E	L	E	L	E	L	E	L	E	L	E	L
ltapine	**27,2**	**26,8**	12,8	12,4	75	**80**	**4,15**	**3,86**	0,89	0,88	**175**	**161**	**53,3**	**51,4**	**197**	**183**
ala 1517/70	**28,6**	**28,2**	13,0	12,7	90	89	**3,86**	**3,61**	**0,92**	**0,89**	**154**	**145**	49,1	48,4	167	1
b	**27,1**	**26,7**	12,6	12,2	84	85	**3,76**	**3,65**	**0,90**	**0,87**	153	152	49,5	50,2	170	6
a	27,6	27,5	12,6	12,5	85	84	**3,72**	**3,50**	0,87	0,86	**155**	**146**	50,7	49,6	178	3
a	27,6	27,3	12,8	12,5	84	85	3,87	3,66	0,90	0,88	159	151	50,7	49,9	178	4

n 173

res in bold type indicate significant differences (P = 0,05) within cultivars: M vs H and E vs L.

ABLE 3: AVERAGE COTTON FIBRE PROPERTY VALUES COMPARING TI HARVESTING: 1979

Cultivar	2,5% Span Length (mm)		50% Span Length (mm)		Pressley (1000 psi)		Micron-aire		Maturity ratio		Fineness (mtex)		Perimeter (μm)		Standard Fineness (Hs)	
	E	L	E	L	E	L	E	L	E	L	E	L	E	L	E	L
:ala 1517BR1	**29,1**	**30,1**	13,5	13,8	**96**	**89**	3,80	3,84	0,96	0,96	145	148	46,5	47,1	150	154
:ala 1517/75	28,2	28,1	13,0	12,7	**83**	79	**3,79**	**4,55**	**0,90**	**1,00**	**152**	**177**	49,3	50,5	168	177
:ala 1517/E1	28,9	29,2	**13,7**	**13,2**	92	**86**	3,81	4,12	**0,95**	**1,00**	148	157	47,3	47,7	155	158
:ala SJ1	28,7	29,3	13,1	13,4	**95**	**83**	3,96	4,31	0,95	0,97	**156**	**170**	**48,7**	**50,5**	**164**	**177**
:ala SJ2	27,9	28,7	12,8	12,7	91	90	4,03	4,26	0,96	0,96	158	168	**48,7**	**50,3**	**164**	**175**
:ala SJ5	28,1	28,6	13,2	13,5	93	91	3,87	4,22	**0,95**	**1,01**	151	160	47,9	47,9	159	159
eltapine 61	29,0	29,3	13,5	13,3	95	91	3,90	4,25	0,94	1,01	153	161	48,7	48,0	164	160
:ltapine 55	28,9	29,0	12,9	13,2	**88**	**81**	3,81	4,26	**0,92**	**0,98**	152	165	48,8	49,2	165	168
:ltapine 826	**28,3**	**29,6**	12,8	13,0	81	85	3,95	4,46	**0,91**	**1,00**	160	173	50,1	50,4	174	176
arcot DPL	**27,8**	**29,2**	**12,6**	**13,4**	**86**	**81**	4,04	4,48	0,93	0,98	**162**	**177**	50,2	51,1	175	181
bar 627/70B	28,3	28,9	12,8	13,0	91	90	4,11	4,31	0,97	1,03	159	162	48,5	47,7	163	158
arcot Albar	29,5	29,3	13,4	13,5	93	92	3,93	4,27	**0,93**	**1,02**	155	161	**49,1**	**47,8**	167	**158**
:l Cerro	31,0	32,2	14,0	14,5	99	99	3,94	4,00	0,98	1,02	151	149	47,1	45,9	154	146
₹3	28,0	28,7	12,7	13,0	89	90	3,94	4,29	**0,92**	**0,98**	159	169	49,8	50,0	172	173
:an	28,7	29,2	13,1	13,3	91	88	3,92	4,26	0,94	1,00	152	164	48,6	48,9	164	166

Early; L = Late

res in bold type indicate significant differences (P = 0,05) within cultivars: E vs L.

Other than the substantially larger amount of trash, of between 26 and 44%, in machine-picked cotton, there were no other strong and consistent fibre property differences between methods of picking, except perhaps that the machine-picked cottons tended to be slightly shorter (up to 4mm), finer (up to 15 mtex), weaker (up to 3 800 psi) and had a lower micronaire (up to 0,23) than the hand-picked cottons. These trends may have been different had machine-picked samples been available for testing in 1979, which season is known to have produced a superior cotton crop compared with the two previous seasons due to more favourable weather conditions. However, increased trash content, and therefore reduced grade, and shorter length are consistent with other reported results[2,3,4].

Early-picked cotton was slightly longer (up to 0,8mm) than late-picked cotton in 1977 and 1978 but shorter (0,5mm) in 1979. It was slightly stronger (up to 3 000 psi) in 1977 and 1979, with no difference in 1978. It was slightly coarser (up to 13 mtex) with a higher micronaire (up to 0,24) in 1977 and 1978 but finer (12 mtex) with a lower micronaire (0,34) in 1979. Maturity and trash differences were small.

On balance over the three years, therefore, there were few, if any, distinct differences between the fibre properties of early-picked cotton and those of late-picked cotton and trends were not consistent. It is clear, however, that the seasonal weather conditions of 1979 were sufficiently different to those of the preceding two years that they caused the relative fibre property values of the early- and late-picked cottons not only to change but also, in most cases, to reverse in that year.

CONCLUSION

The absence of any well-defined pattern in fibre properties, other than the larger trash content of machine-picked cotton, caused by any one influential parameter, in this case method of picking and time of harvesting, is typical of the cotton production system in which so many factors can influence fibre quality and can also interact. Some of these can be manipulated through management, (e.g. cultivars, agricultural practises and harvesting and ginning technology), while other equally important factors cannot, (e.g. rainfall, temperature, sunshine, and length of season).

The permutations and combinations of environment, machine and management which influence the fibre properties of cotton during its progress along the production and processing route provide ample opportunity for a whole range of fibre properties to be generated from any one cultivar, not only from year to year but also from gin to gin, farm to farm and field to field.

ACKNOWLEDGEMENTS

The authors thank the staff of the Short Staple Processing Department for their technical assistance and the Cotton Board for compiling data and for permission to publish these results.

USE OF PROPRIETARY NAMES

The names of proprietary products where they appear in this report are mentioned for information only. This does not imply that SAWTRI recommends them to the exclusion of other similar products.

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THE EFFECT OF CERTAIN FIBRE PROPERTIES ON THE BULK RESISTANCE TO COMPRESSION OF MOHAIR

by S Smuts, L Hunter and D D Basson

ABSTRACT

The bulk resistance to compression of a wide range of Cape mohair samples was tested and found to increase, albeit only sligthly, as either fibre diameter or degree of medullation or both increased. Both fibre length and the state of relaxation of the fibres had no apparent effect. A value of about 12mm was typical for the compressed height.

INTRODUCTION

The resistance to compression or bulk of a randomised fibre sample is regarded as a simple and quick method of objectively characterising fibre crimp, especially for scoured wool and steamed tops[1]. It can be a more useful measure of crimp if allowance is made for variations in fibre fineness and bending stiffness. Bulk resistance to compression is a useful parameter to measure because loose wool handle, wool processing characteristics and various yarn, fabric and carpet properties are affected by fibre crimp[1,2].

The bulk resistance to compression of a randomised wool fibre sample is determined mainly by the product of staple crimp frequency and fibre diameter[3—17], it increasing as this product increases. Although the bulk resistance to compression is also determined by the bending behaviour of the fibre assembly[4] large differences in it could not be explained by differences in fibre bending moduli[18], crimp being of overriding importance. Fibre surface characteristics[19,20] and fibre length (above 25mm)[21,22] have been found to have little effect on loose wool bulk resistance to compression. It was found that for carpet wools, bulk resistance to compression tended to increase as the degree of medullation increased[17,23].

Although considerable work has been carried out on the bulk and resistance to compression of wool, little, if any, similar research has been carried out on mohair. The aim of this work, therefore, was to study the effects of fibre diameter and length and degree of medullation as well as that of the state of relaxation of the fibres on the resistance to compression of a range of Cape mohair samples.

EXPERIMENTAL

Undyed mohair samples in both scoured and top states were tested under standard atmospheric conditions (20°C ± 2°C and 65 ± 2% RH).

TABLE I
AVERAGE VALUES FOR SOME MOHAIR PROPERTIES

Sample State	Fibre Diameter			Single Fibre Length			Area Medullation			Resistance to Compression		
	Mean (μm)	CV (%)	Range (μm)	Mean (mm)	CV (%)	Range (mm)	Mean (%)	CV (%)	Range (%)	Mean (mm)	CV (%)	Range (mm)
coured Mohair	32,4	16	23-44	—	—	—	1,7	109	0,3-10,0	12,0	4	11,0-13,
op	33,7	17	24-46	101	10	79-122	1,0	47	0,3-2,4	11,5	3	10,8-12,
verall Mean	33,0	17	—	—	—	—	1,4	1,08	—	11,8	4	—
ustre Wool*	36,0	12	31-43	—	—	—	—	—	—	13,7	3	13,2-14,

– included for purposes of comparison

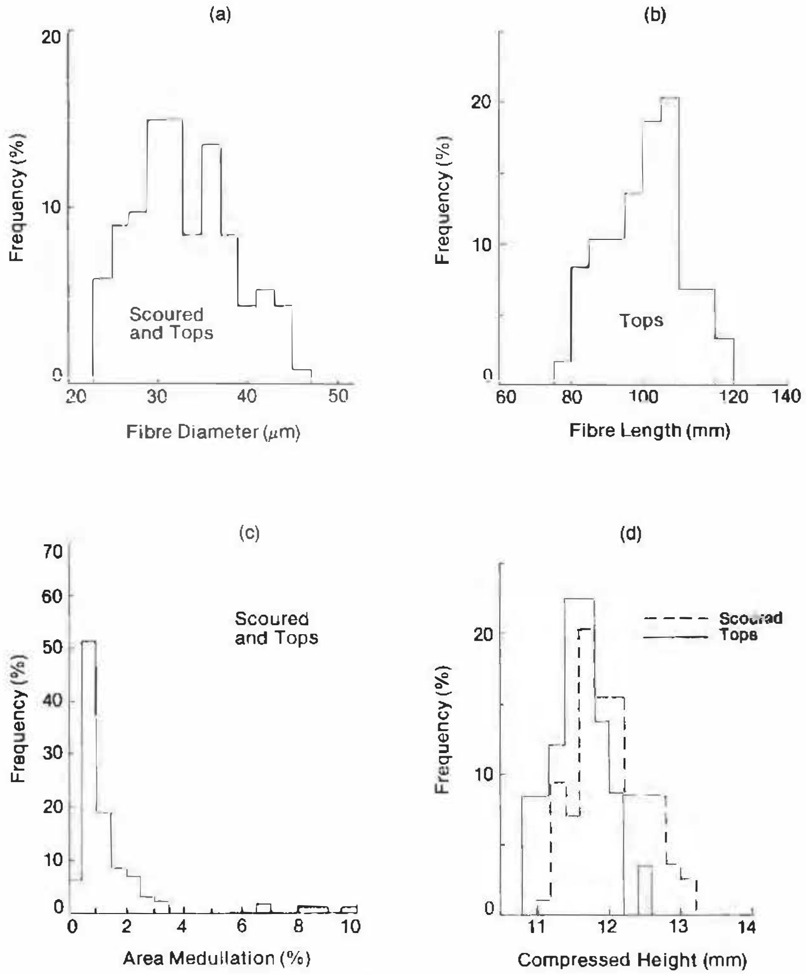

Fig. 1 — Some Distribution Curves for Different Properties of the Mohair Samples Tested.

Fibre diameter[24] (measuring a minimum of 300 snippets per slide on each of six slides) and length[25] (measuring a minimum of 1 200 fibres per sample) were measured according to IWTO test methods, while degree of medullation[26] and bulk resistance to compression[5,22,27] were measured according to SAWTRI methods. The bulk resistance to compression was determined on scoured and top samples in both the "as received" (unsteamed) and steam relaxed[5] states.

Because of the large number of individual results involved these have been omitted and only the average values, ranges, etc. for the various properties measured are summarised (see Table I). Distribution curves for the various fibre properties measured are given in Fig. 1.

RESULTS AND DISCUSSION

Effect of Fibre State

The first aspect investigated was the relationship between the resistance to compression of the samples in the various states. This is illustrated by the results obtained on selected samples and which are summarised in Table II. There was no effect of any practical importance due to fibre state.

Effect of Fibre Length

To determine the effect of fibre length on the bulk resistance to compression, multiple regression analyses were carried out on data obtained on scoured samples which varied largely in fibre diameter (the range being about 23 µm to 45 µm) and length (ranging from about 80mm to 122mm) but which varied relatively little in degree of medullation (ranging from about

TABLE II
THE RESISTANCE TO COMPRESSION OF MOHAIR IN VARIOUS STATES

Code	Fibre Diameter (µm)		Resistance to Compression (Compressed Height in mm)			
			Scoured Samples		Top Samples	
	Scoured	Top	Unsteamed	Steamed	Unsteamed	Steamed
MOH 3	34,1	33,9	12,0	12,0	11,8	12,5
MOH 6	26,0	26,0	11,6	11,7	12,8	11,6
MOH 15	44,5	45,6	11,9	12,7	12,5	12,4
MOH 19	29,7	29,9	11,8	11,9	11,5	11,8
MOH 23	38,4	39,9	12,3	12,4	12,2	12,8
MOH 24	27,6	28,7	11,8	11,4	11,3	11,5
MOH 25	38,2	38,1	11,6	11,3	11,5	11,6
MOH 30	31,9	22,1	11,9	12,2	11,9	12,4
MOH 37	34,2	36,2	12,0	11,8	11,6	12,2
MOH 38	24,0	24,4	12,2	12,1	10,9	11,6
MOH 43	41,4	41,9	11,9	12,1	12,0	12,0
Mean			11,9	12,0	11,8	12,0
Standard Deviation			0,2	0,4	0,6	0,4
CV %			1,8	3,3	4,6	3,7

0,3% to 2,6% area medullation). For these results there was no correlation between fibre length and diameter. Log-log and multiquadratic regression analyses were carried out with bulk resistance to compression of the scoured samples (Y_1) as the dependent variable and fibre diameter (X_1) and mean fibre length (X_2) as the independent variables. Both analyses showed that fibre length had no significant effect on bulk resistance to compression, which is in line with earlier studies[21,22] on wool where no effect of fibre length on the bulk resistance to compression was observed. The bulk resistance to compression increased slightly with an increase in fibre diameter as illustrated by Fig. 2(a) and the following regression equation:

$$Y_1 = 0{,}036\,X_1 + 10{,}73 \qquad (1)$$
$$n = 49\,;\ r = 0{,}48$$

Resistance to compression results obtained on unsteamed tops were similarly analysed and verified the above findings obtained on the scoured mohair samples.

Effect of Fibre Diameter and Medullation

Both log-log and multiquadratic regression analyses were carried out on results obtained on scoured samples which also covered a relatively wide range of medullation. The samples were so selected that fibre diameter was not correlated with degree of medullation. Because fibre length has already been

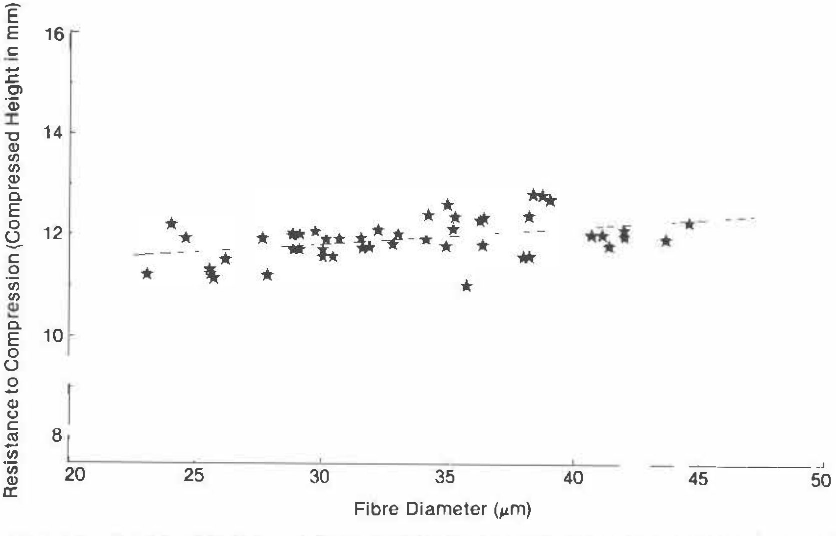

Fig. 2(a): The Relationship between Bulk Resistance to Compression and Fibre Diameter for Mohair having a Relatively Constant Degree of Medullation.

shown to have no effect on the resistance to compression, it was not included in these analyses. Therefore bulk resistance to compression (Y_1) was regressed against fibre diameter (X_1) and degree of medullation (X_3) only. Both analyses showed that bulk resistance to compression increased slightly as either fibre diameter or degree of medullation or both, increased as illustrated by the following regression equation:

$$Y_1 = 0{,}036\,X_1 + 0{,}0045\,X_1X_3 + 10{,}6 \quad \ldots\ldots\ldots\ldots \quad (2)$$

% Contribution: 13 21

$n = 74;\ r = 0{,}58$

Regression lines derived from Eq. (2) and illustrating these effects are shown in Fig. 2b. The effects of both fibre diameter (over the wide range covered, viz. 23 to 45 μm) and degree of medullation (over a range normally encountered in Cape mohair, viz. about 0 to 2% area medullation) were small.

In Fig. 3 the bulk resistance to compression of mohair is compared with that of other fibres. A typical curve[27] for steamed tops derived for wools conforming to Duerden's limits[28] has been plotted on this graph, as well as a regression line derived from results obtained previously[29] on staple polyester fibres. Fig. 3 clearly illustrates the importance of fibre crimp. The higher resistance to compression and the larger variation in the results for both wool

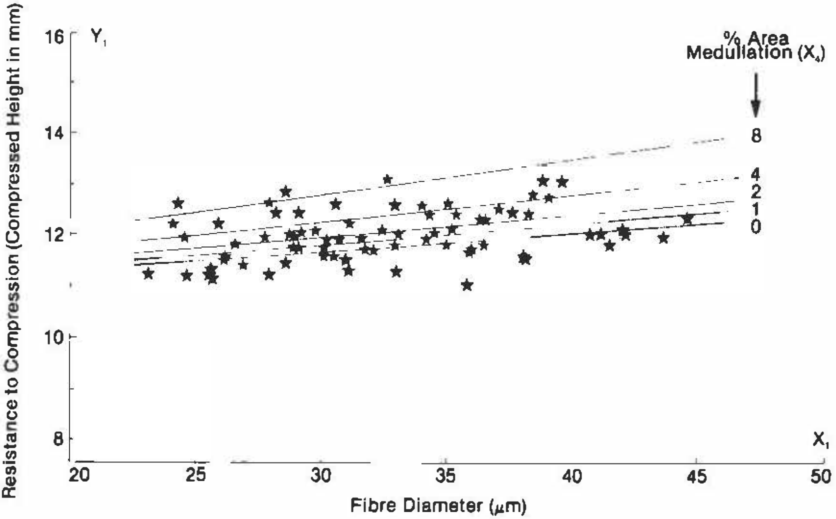

Fig 2(b): The Relationship between Bulk Resistance to Compression and Fibre Diameter and Degree of Medullation.

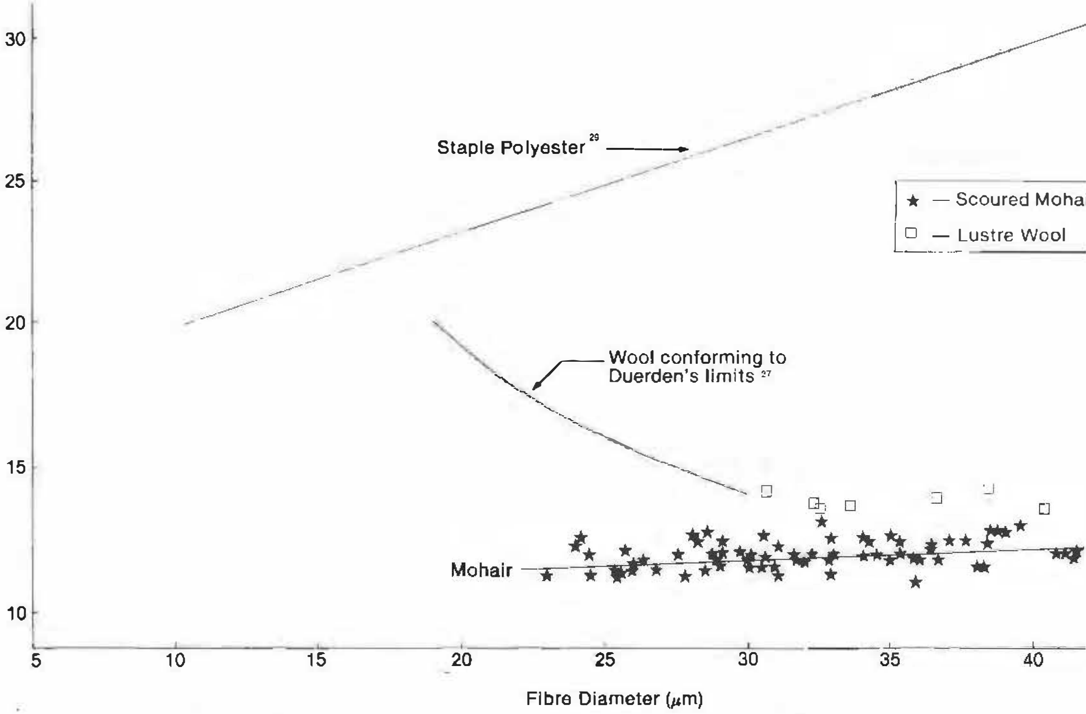

Fig 3: Bulk Resistance to Compression vs. Fibre Diameter for Some Different Fibre Types.

and staple polyester, as compared to that of mohair, are mainly due to the presence of crimp and its variation between samples. This is also illustrated by the similarity between the results of the mohair and those of the low crimp ($\approx$ 0,7 crimps per cm) lustre wools. Fibre stiffness and possibly even friction may, however, also have contributed to the observed differences in the bulk resistance to compression of the different fibre types.

SUMMARY AND CONCLUSIONS

The effects of fibre state (steamed vs unsteamed, top vs scoured), fibre diameter, fibre length and degree of medullation on the bulk resistance to compression of mohair were investigated. A comparison was also made between the bulk resistance to compression of mohair and that of merino wool, lustre wool and staple polyester fibres.

Generally, the effects due to the fibre state and the various fibre properties (over the ranges commonly encountered in Cape mohair) were small and probably of little practical importance. The bulk resistance to compression was not affected by the fibre length but increased, albeit only slightly, as either fibre diameter or degree of medullation or both increased. As may be expected, mohair had a lower bulk resistance to compression than either wool or staple polyester, mainly due to its lack of crimp. Low crimp lustre wool had a bulk resistance to compression marginally higher than that of mohair.

An average value for the bulk resistance to compression of mohair, irrespective of the state, would appear to be about 12,0 mm (3% CV).

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USE OF PROPRIETARY NAMES

The names of proprietary products where they appear in this report are mentioned for information only. This does not imply that SAWTRI recommends them to the exclusion of other similar products.

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