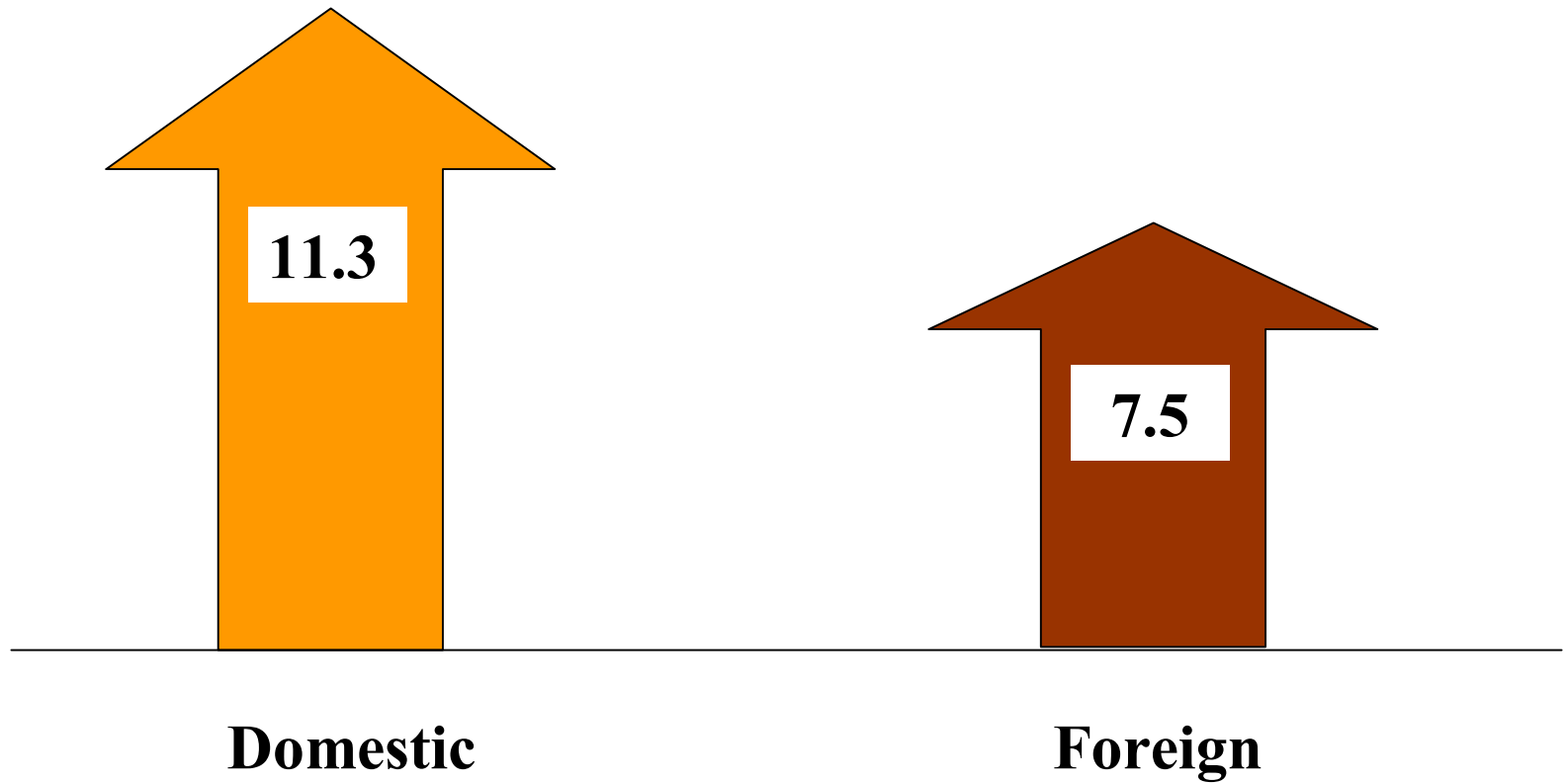
A close-up photograph of a cotton plant. In the foreground, a large, fluffy white cotton boll is in focus, attached to a brown, dried seed pod. To the left, another seed pod is visible, partially open, showing the internal structure. The background is a soft-focus green, suggesting other parts of the plant and foliage. The overall scene is brightly lit, likely by natural sunlight.

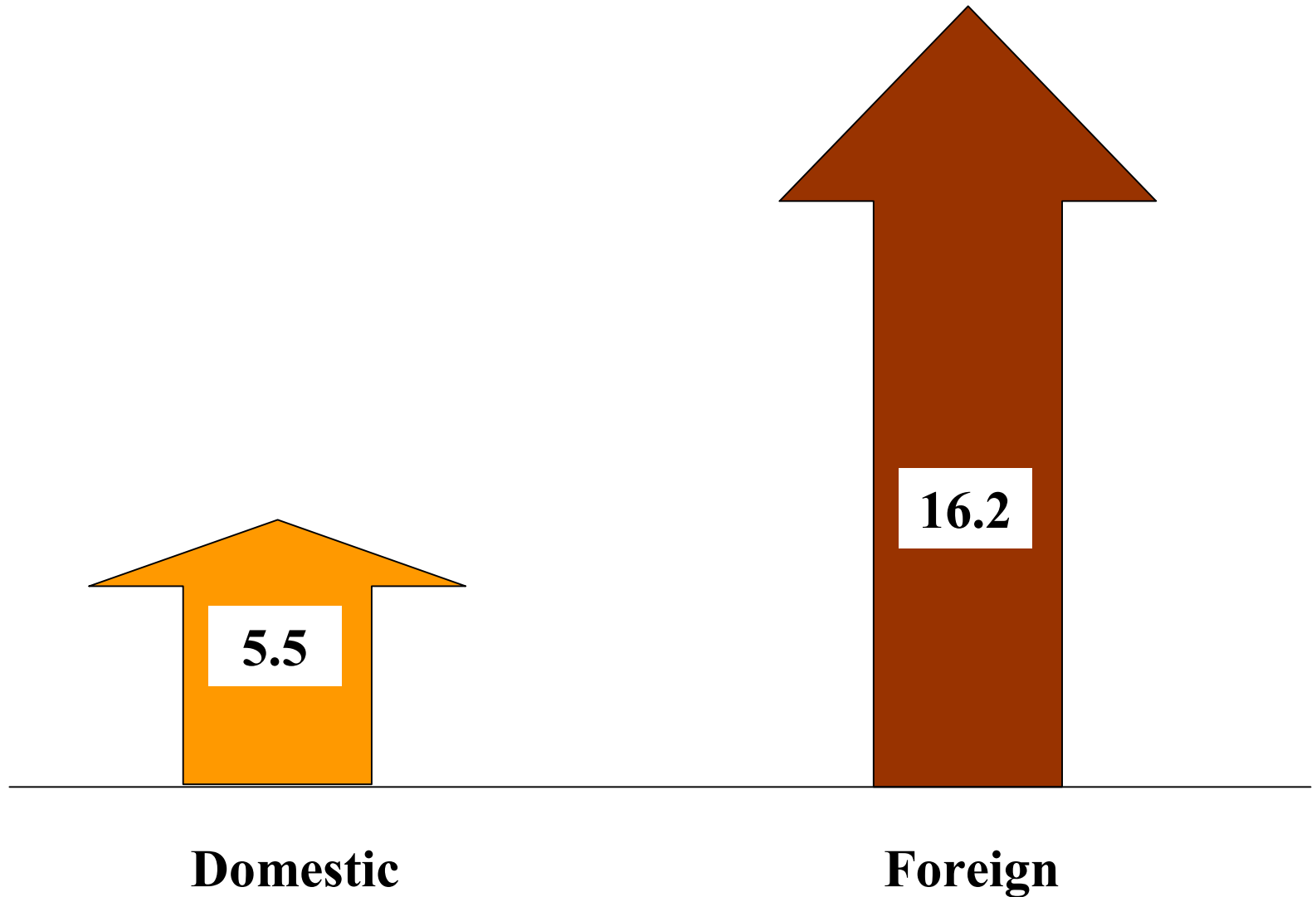
**Fiber Quality Demands
for Exports to World Markets**

E.F. Hequet

1997 Cotton Sales (millions)



2007 Est. Cotton Sales (millions)

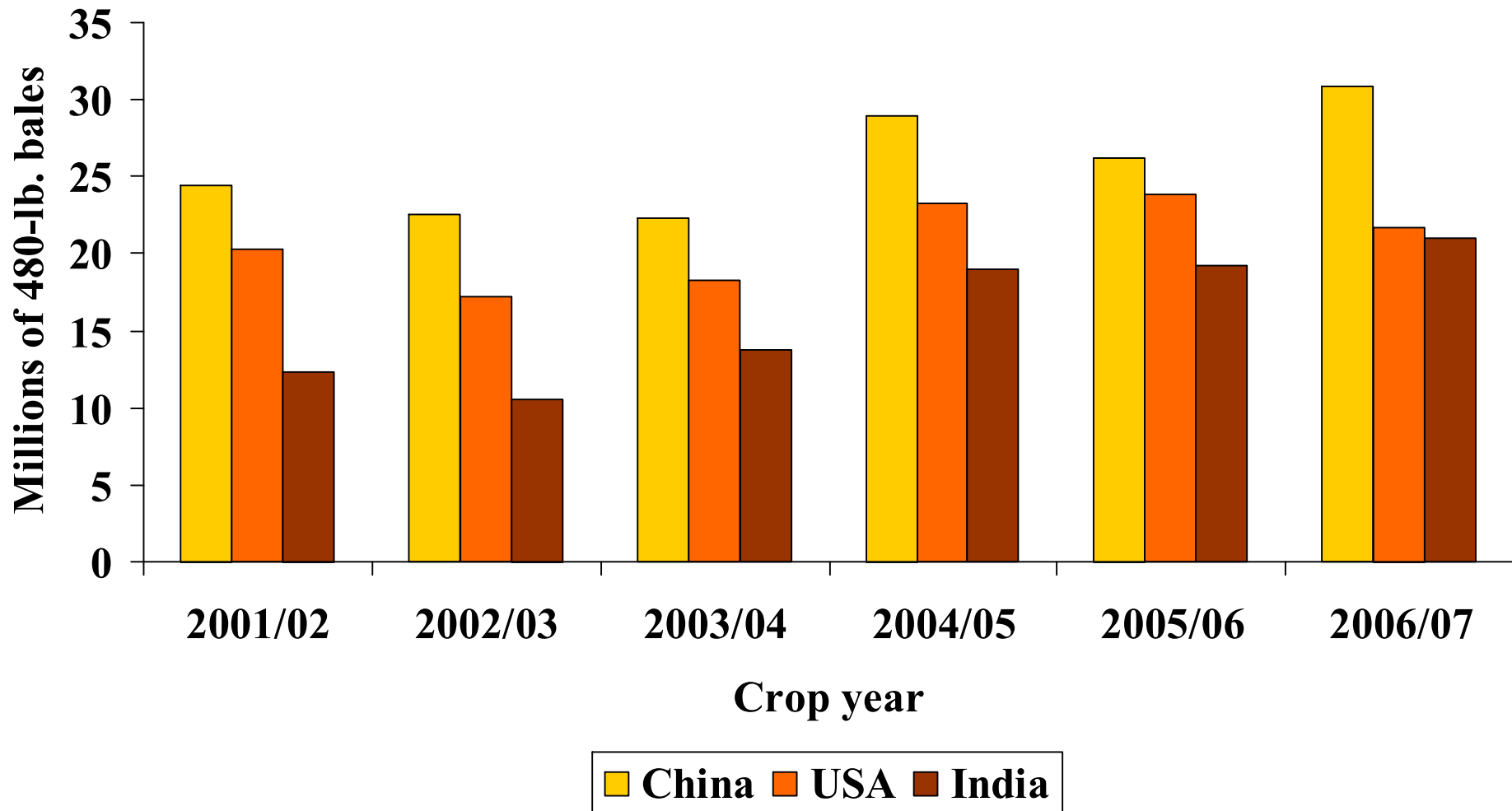


Number of spindles

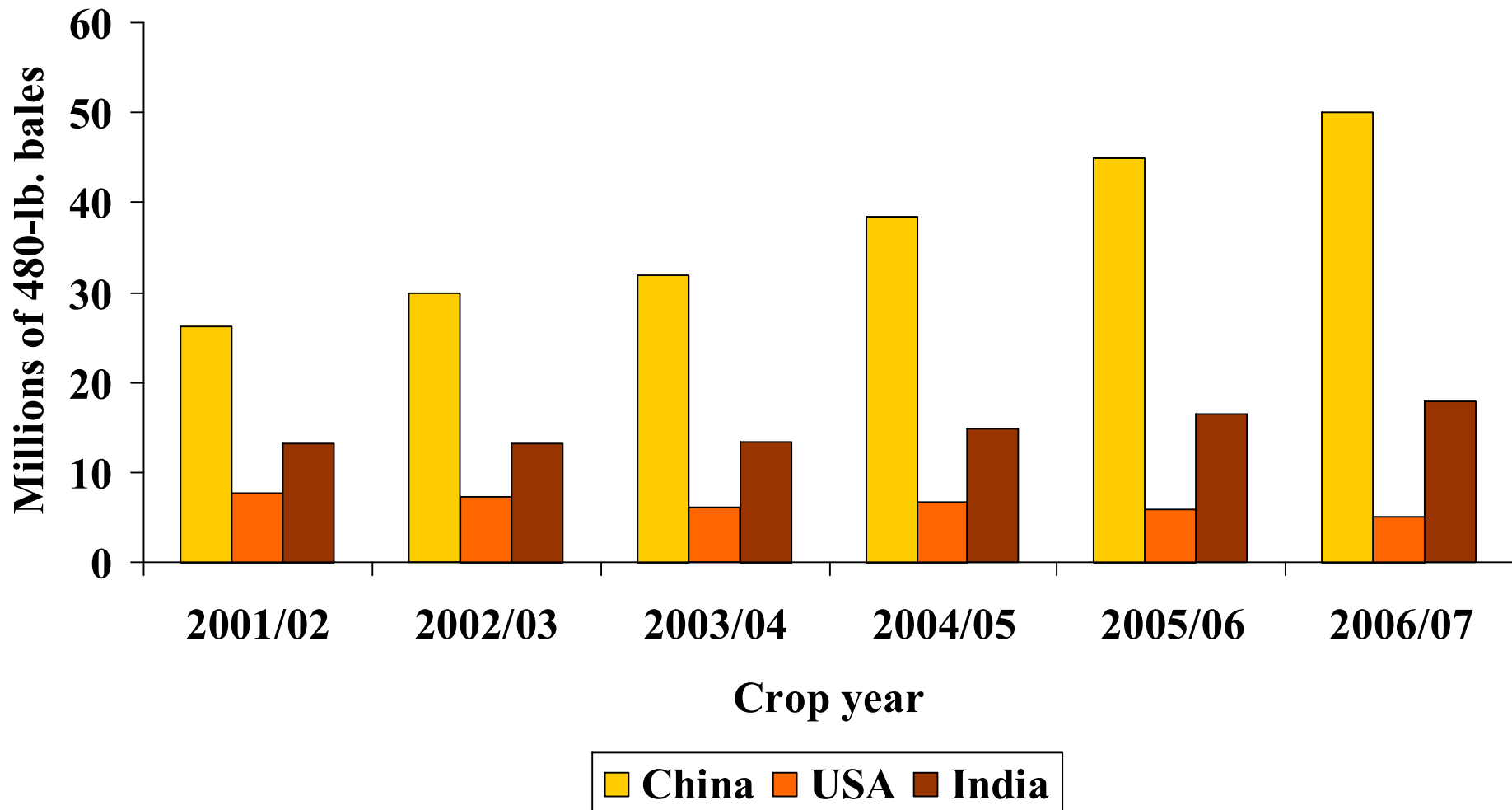
		1984	1994	2004
Rotor	US	300,000	1,008,000	569,000
	China	100,000	550,000	1,160,000
Ring	US	14,330,000	6,261,000	1,602,000
	China	22,000,000	41,585,000	67,000,000

Source ITMF

Cotton production



Cotton consumption



Background

Increased reliance on the export market will require U.S. cotton to compete in terms of both price and quality with foreign crops.

Base level

	U.S.A.	International
Staple	34	35
Tenacity	26	28
Micronaire	3.5-4.9	3.8-4.6
UI%	80-82	82-83
Color	41	31
Leaf	4	3

Situation in Texas

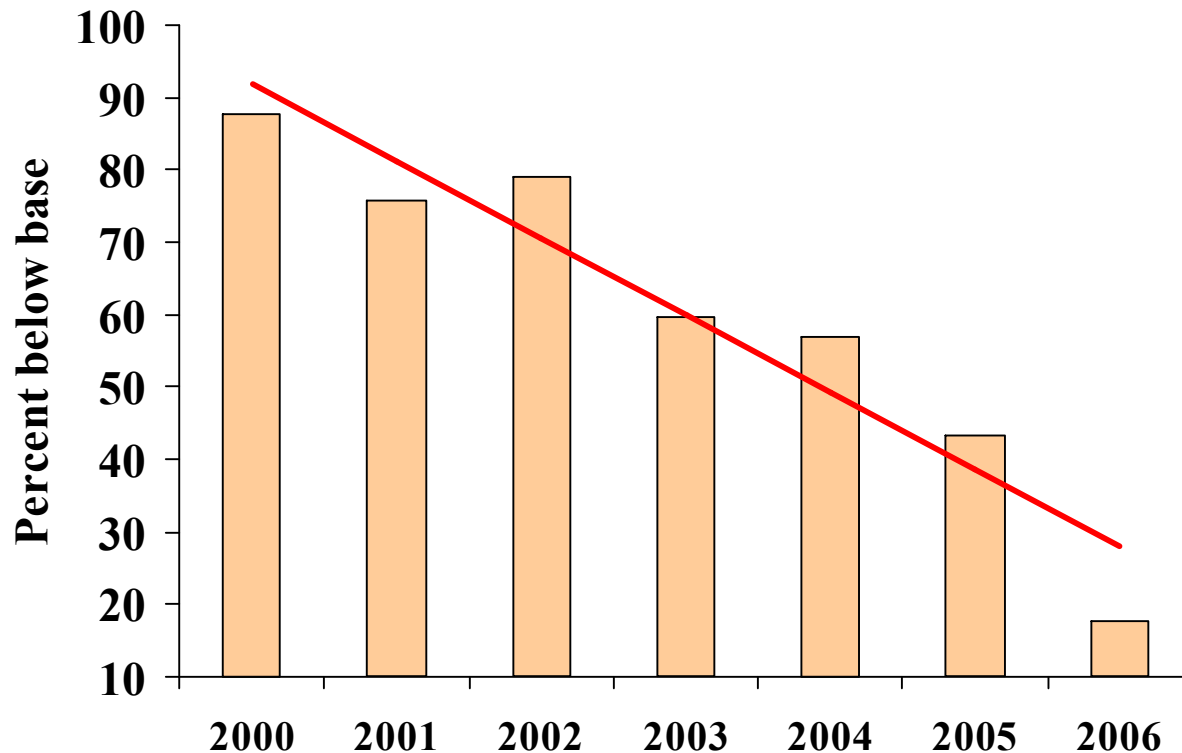
Crop year 2004-05: base or better (Staple, Tenacity, Micronaire, UI%, Leaf)

	U.S.A. base	Int base	ICAC base
Nb. Bales	3,016,030	402,453	98,490
% *	40.2	5.4	1.3

*** 7,497,295 bales produced in Texas**

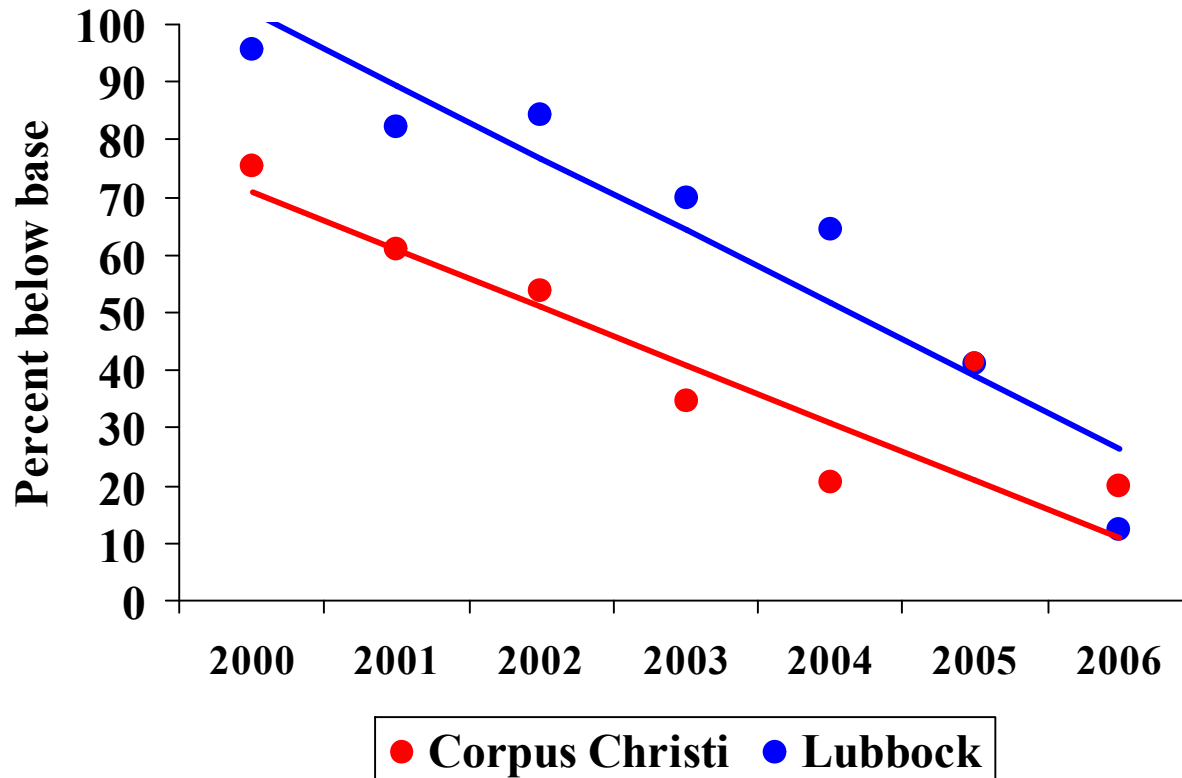
Background

For the entire state of Texas, the percentages of the production below the international base for length (staple 35) were:



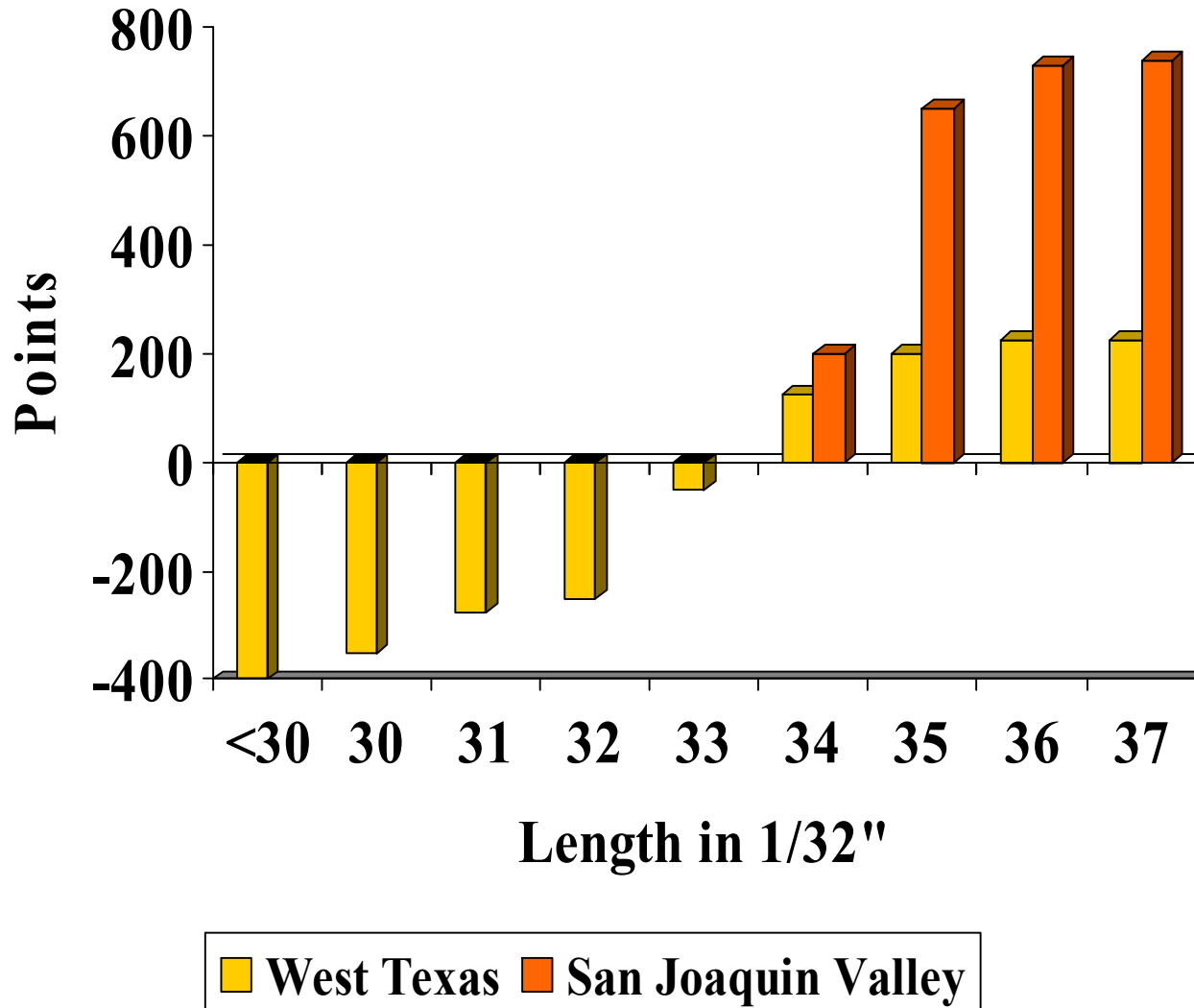
Background

The situation is quite different across classing offices within Texas:



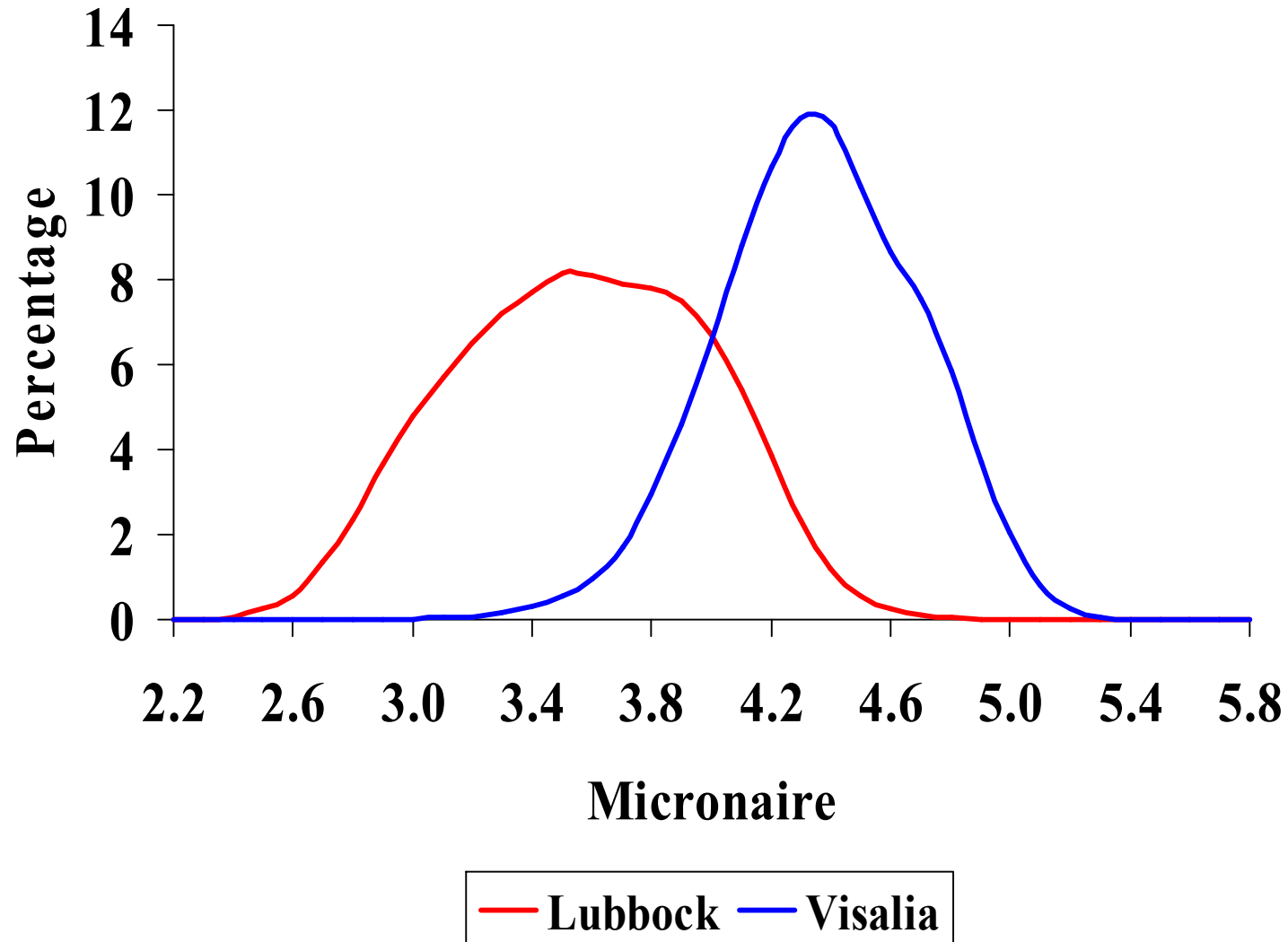
Premiums & discounts for cotton

41 - Leaf 1-2 (Jan. 30, 2007)



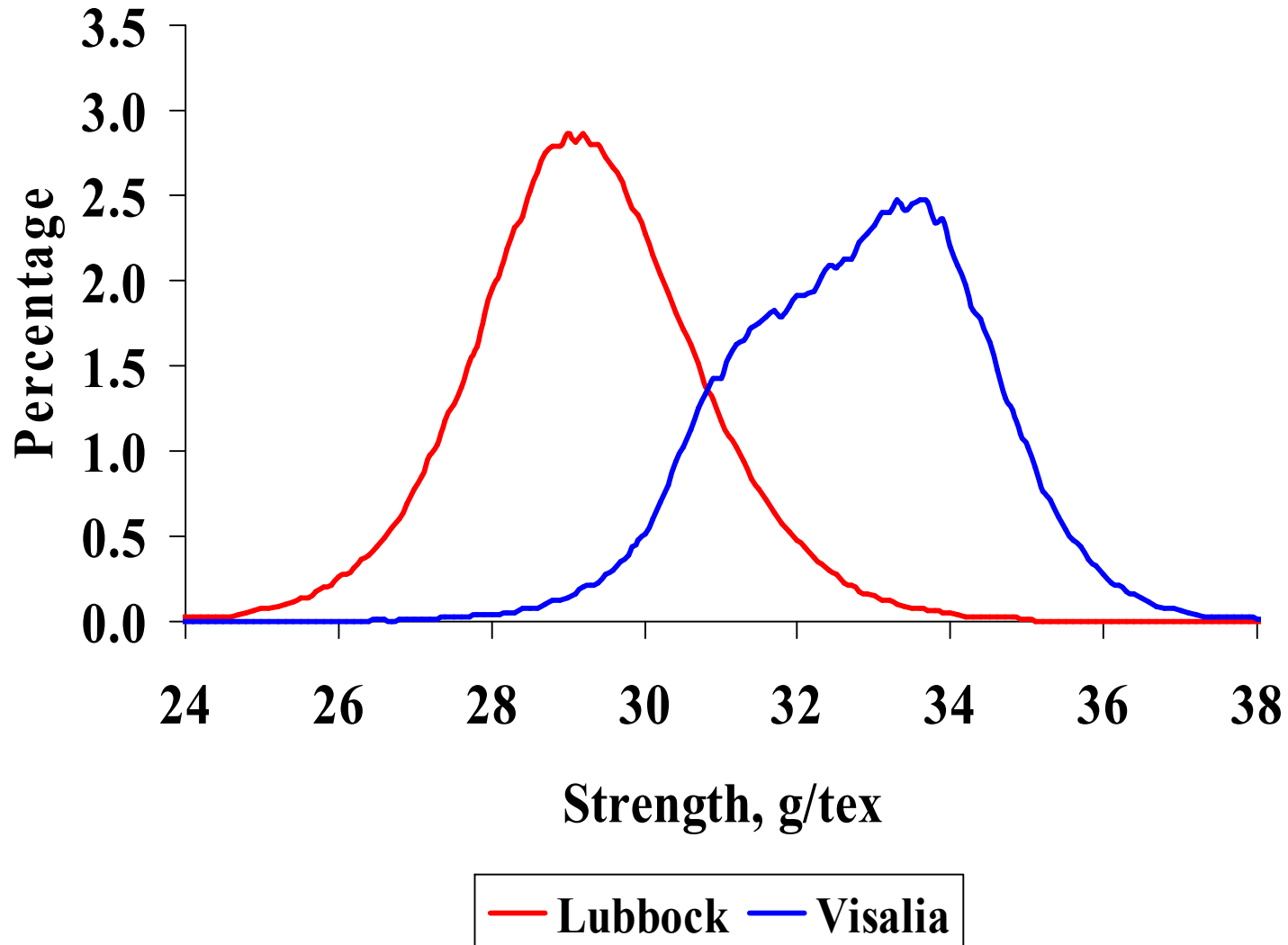
Micronaire distribution

Staple length = 34 or higher

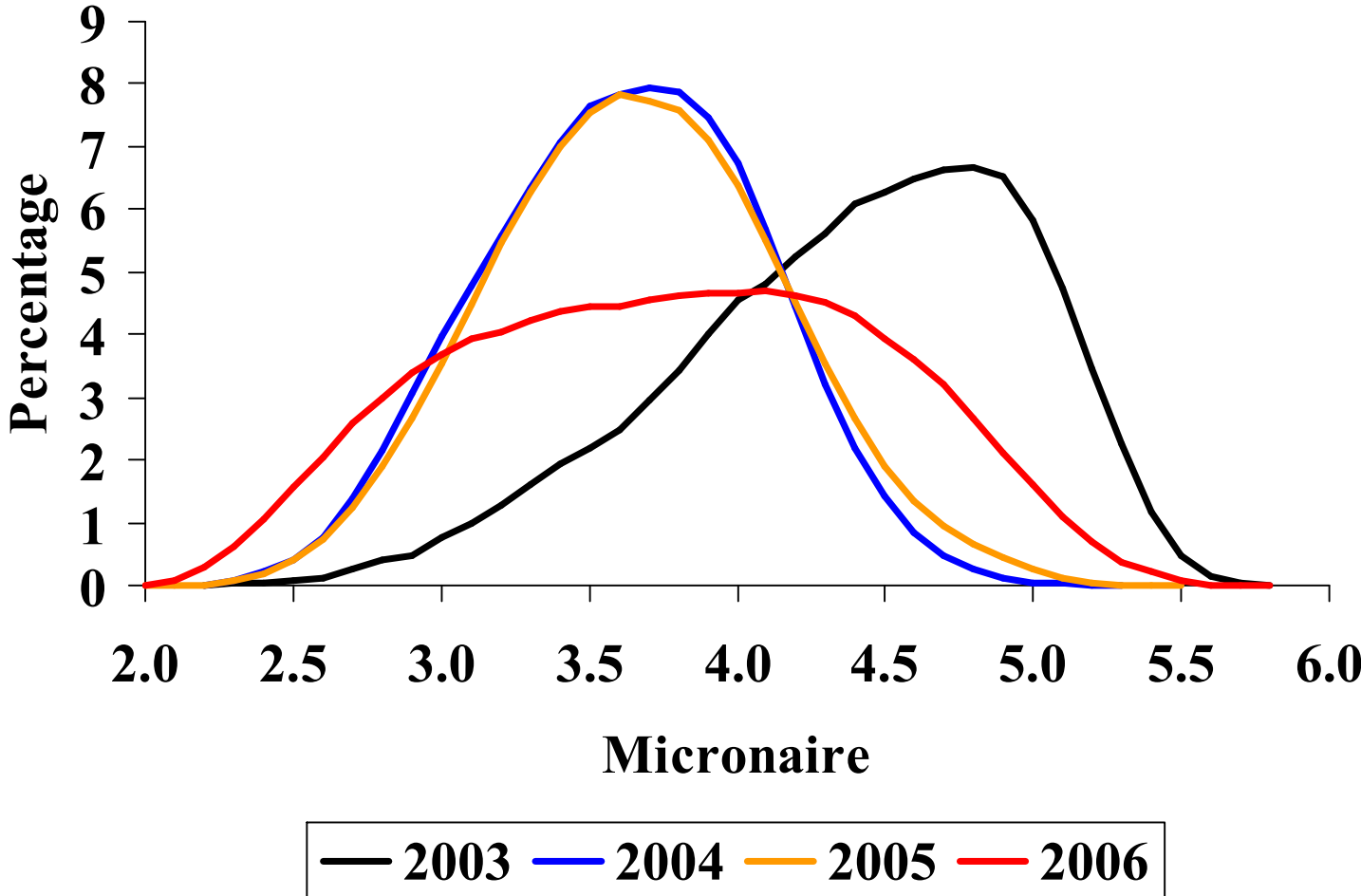


Strength distribution

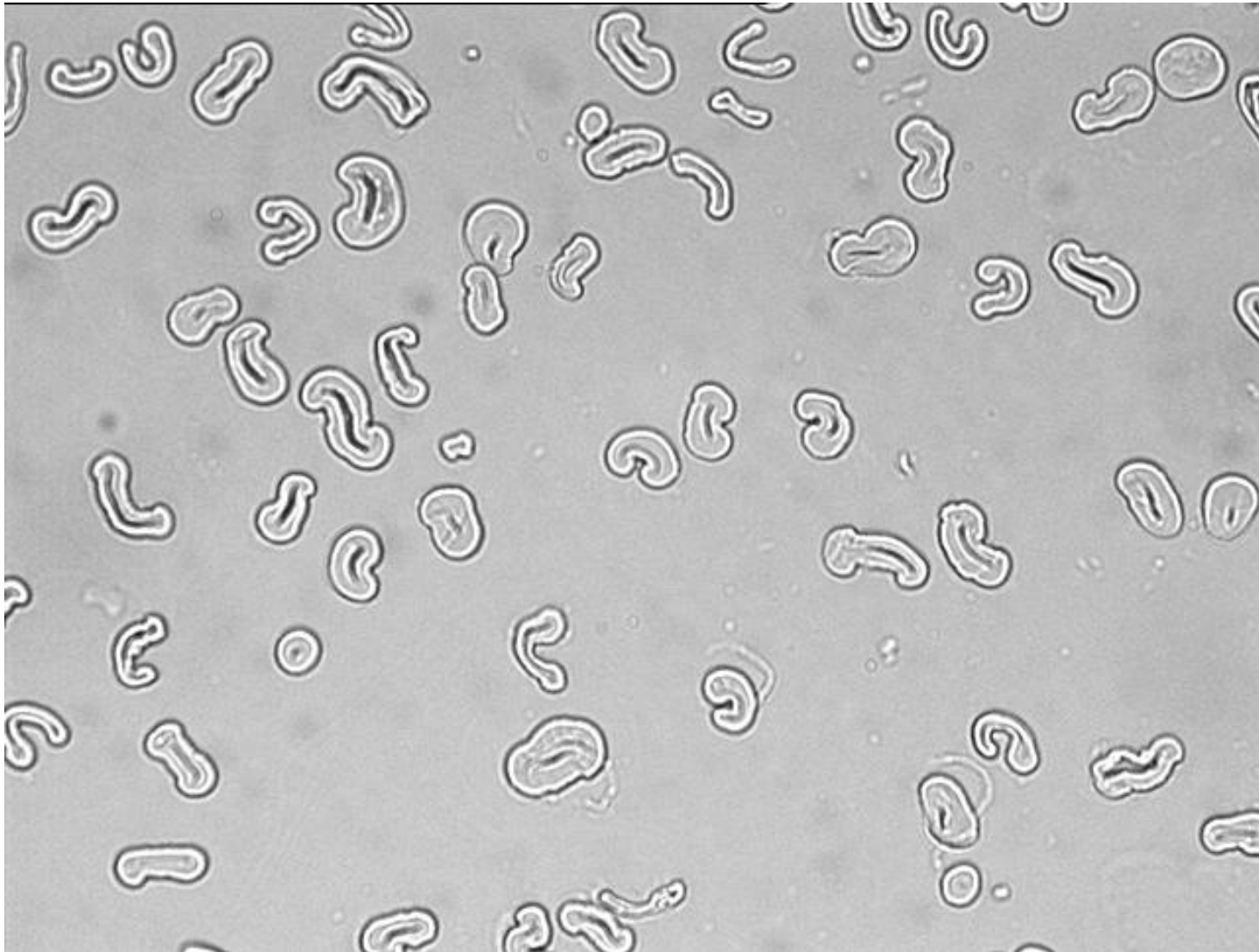
Staple length = 34 or higher



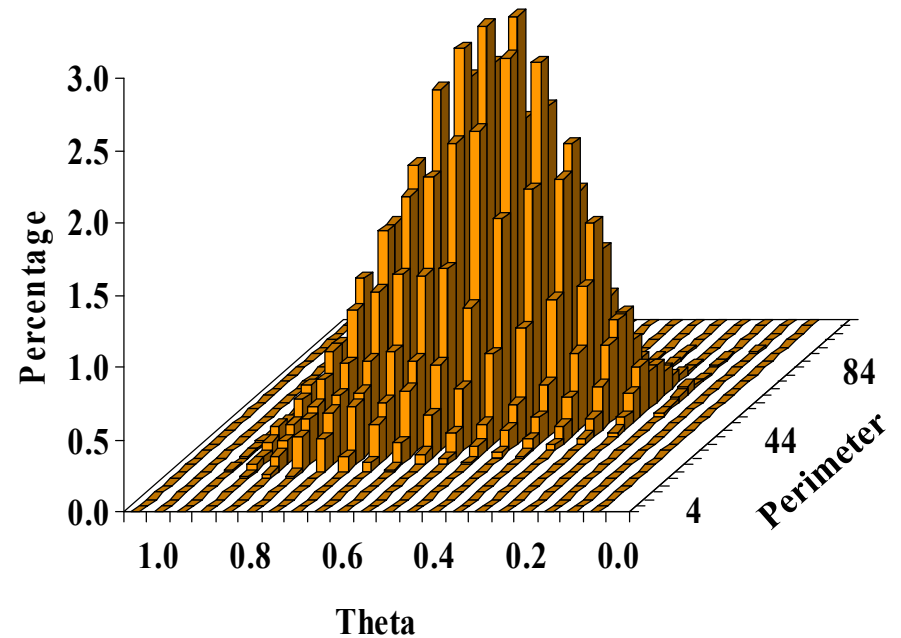
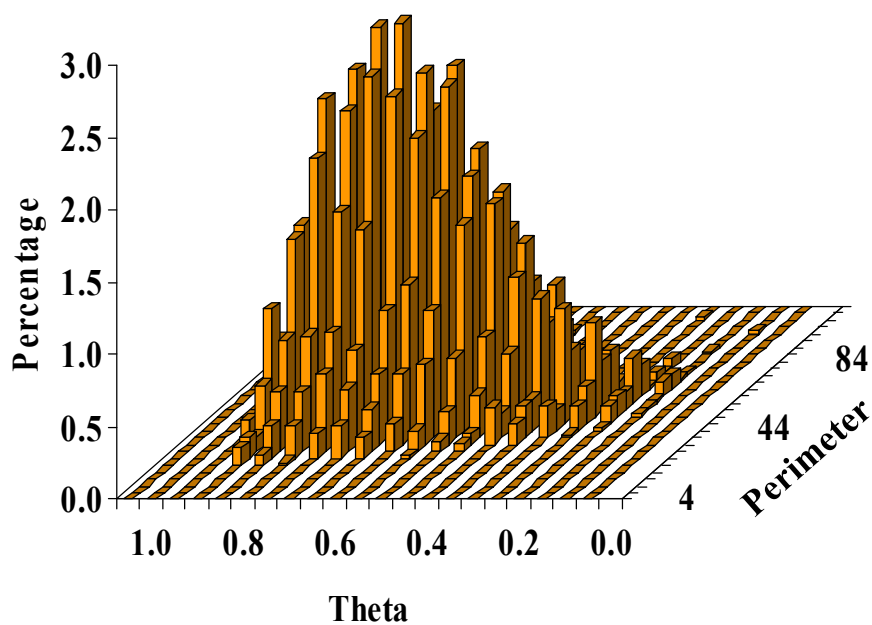
Micronaire Lubbock Classing Office



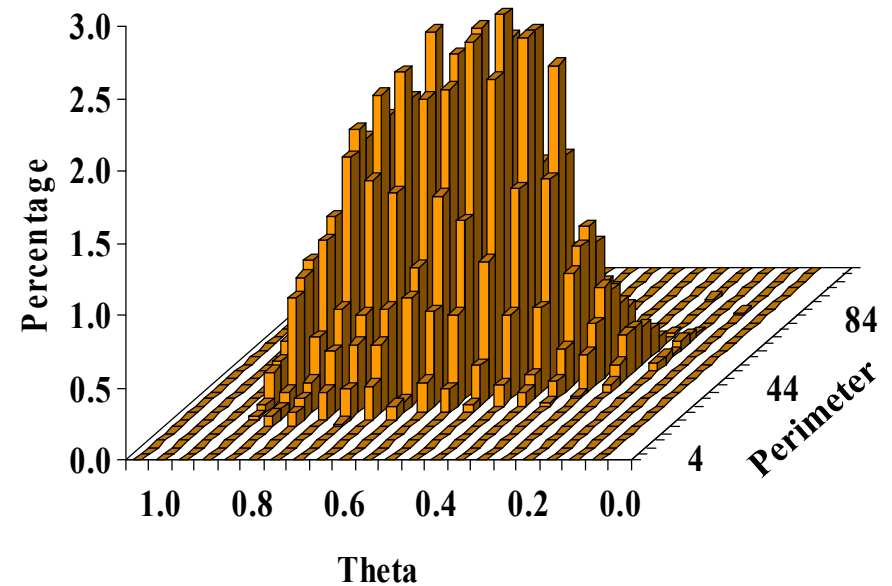
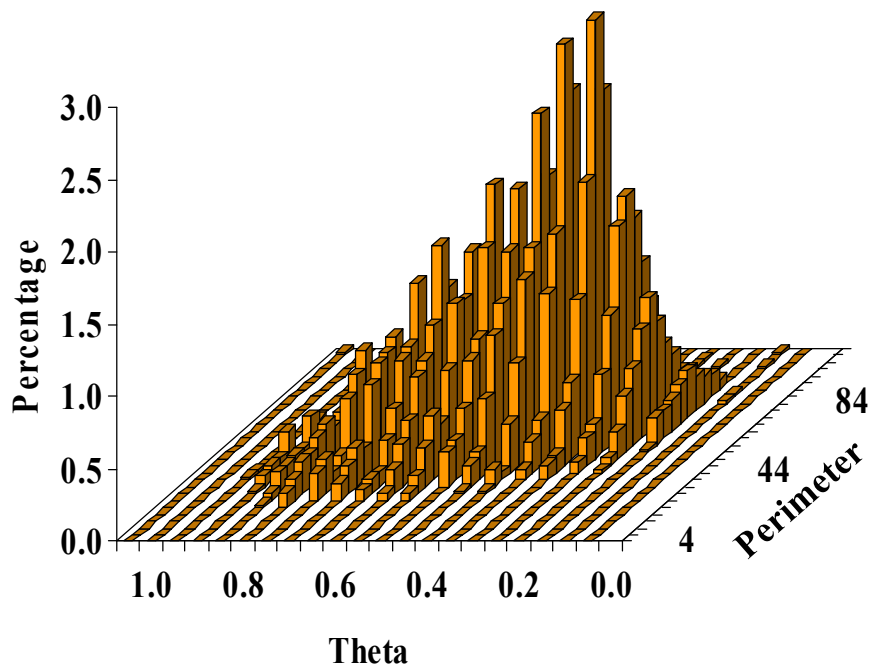
Typical cotton fiber cross-sections



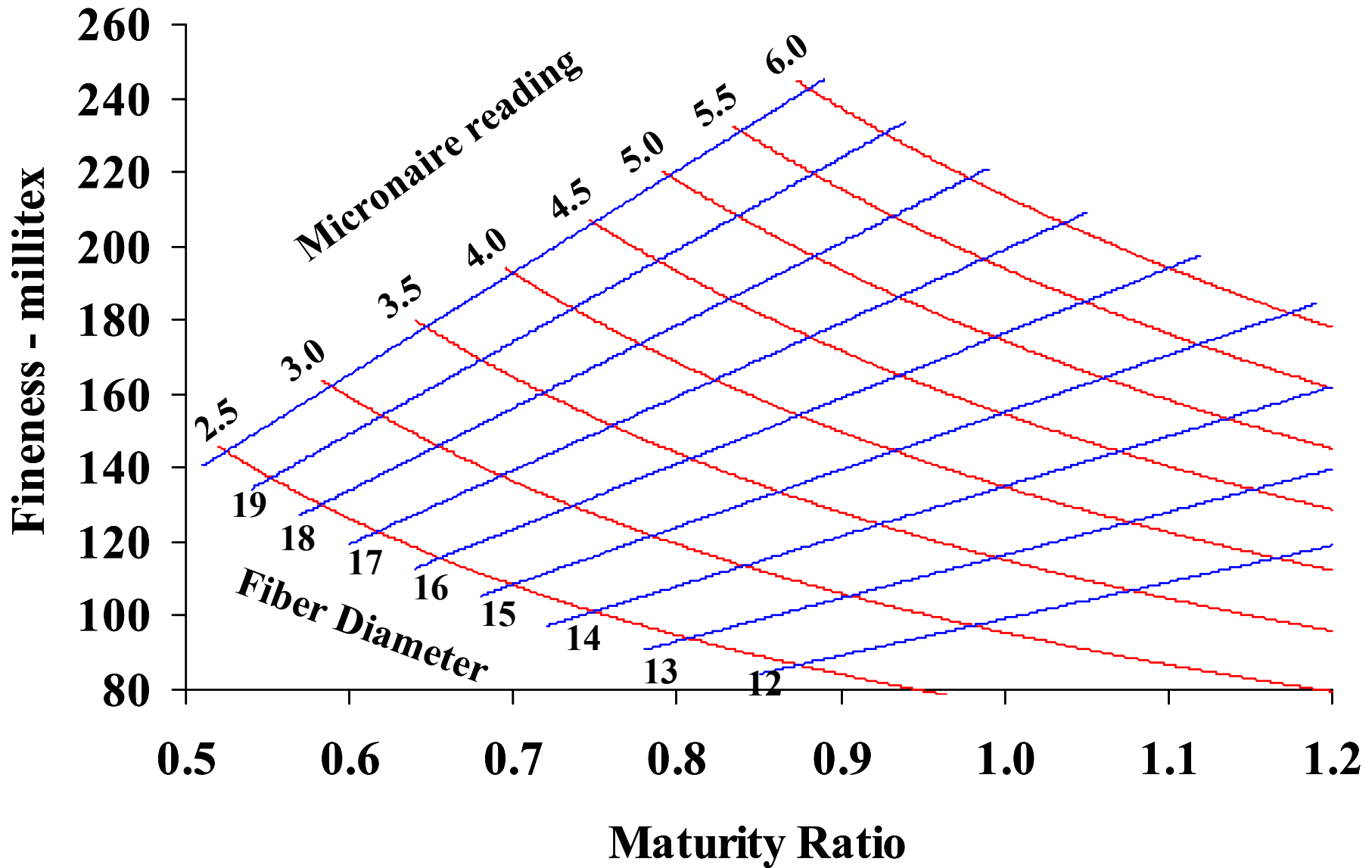
Bivariate distributions (perimeter and theta) for 2 cottons having the same micronaire (4.28)



Bivariate distributions (perimeter and theta) for 2 cottons having the same micronaire (3.38)



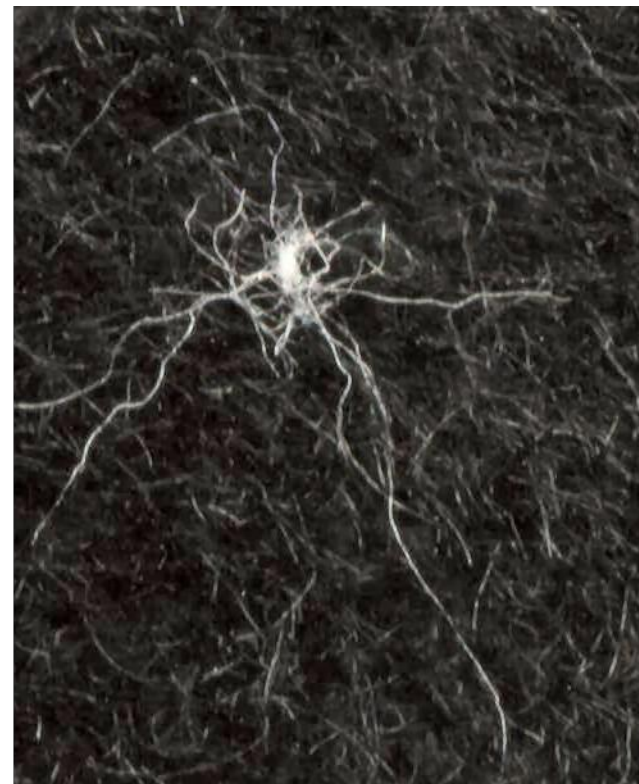
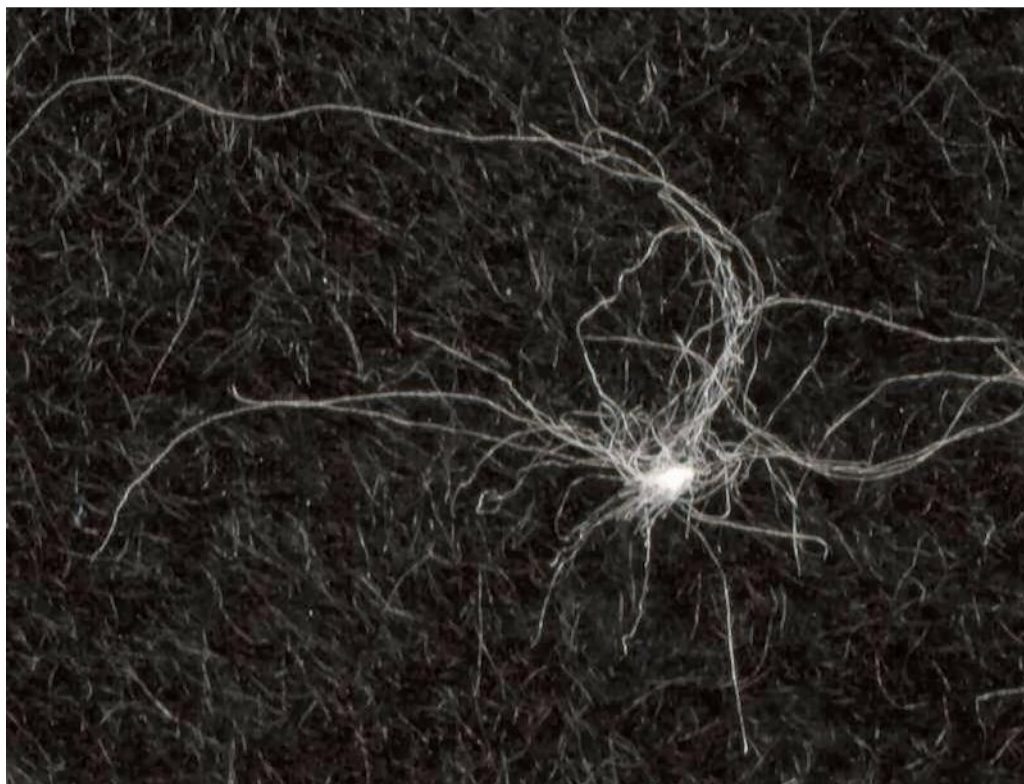
Relationship MR-H-Micronaire-Diameter



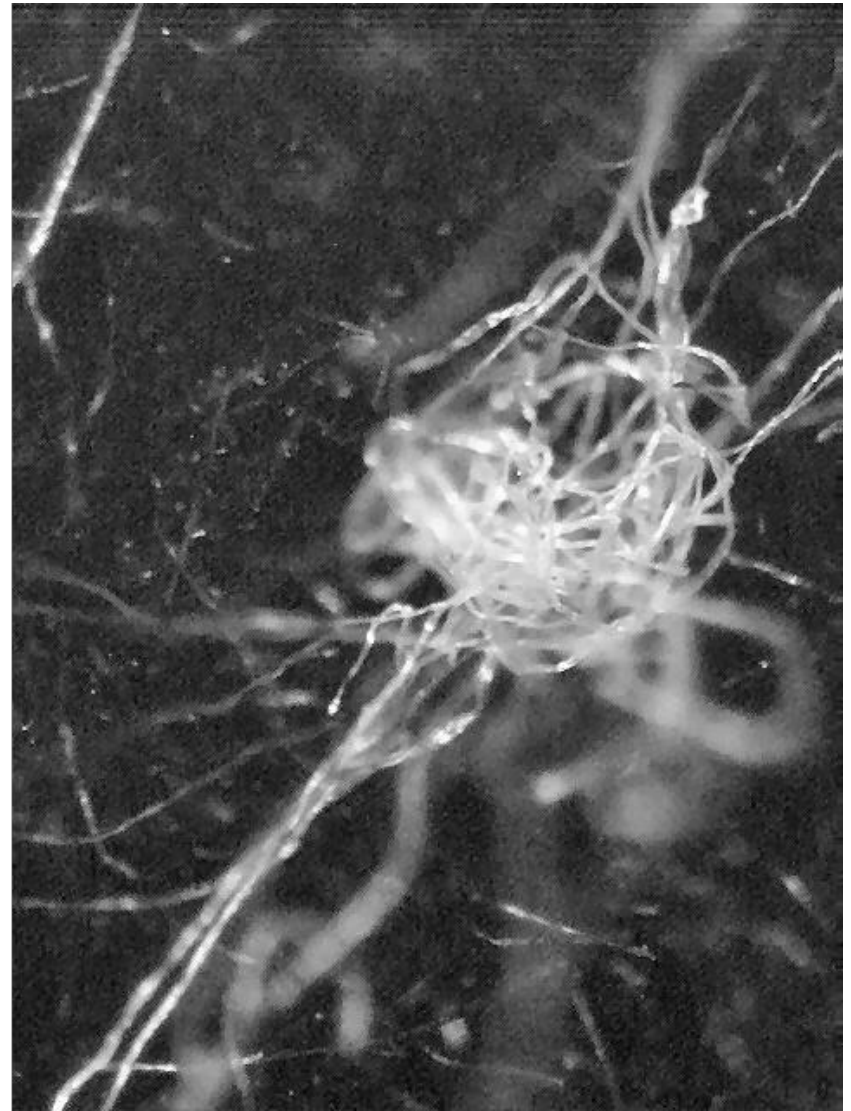
What is a fiber nep?

- **A small knot of entangled fibers that usually will not straighten to a parallel position during carding or drafting**

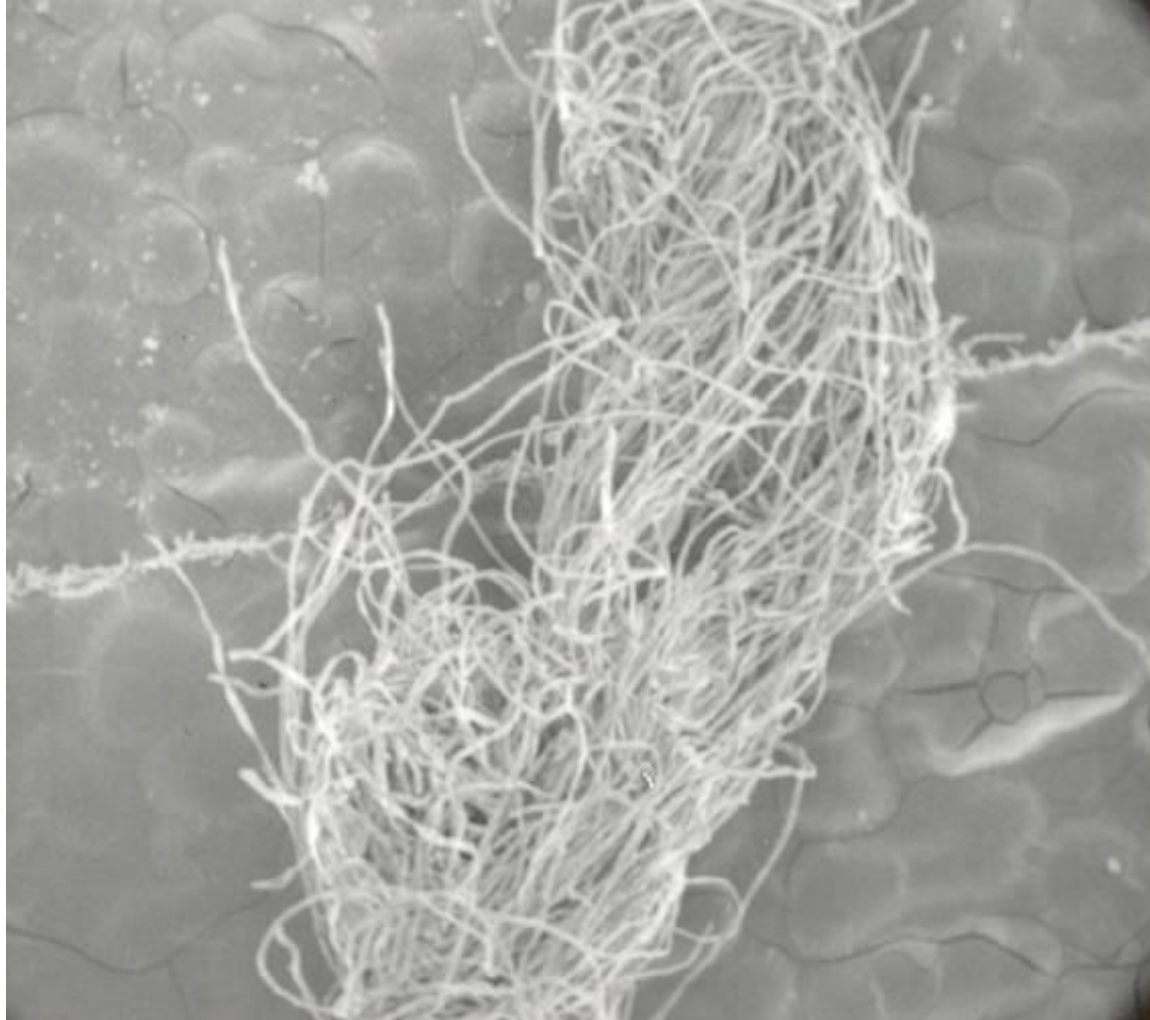
Fiber nep



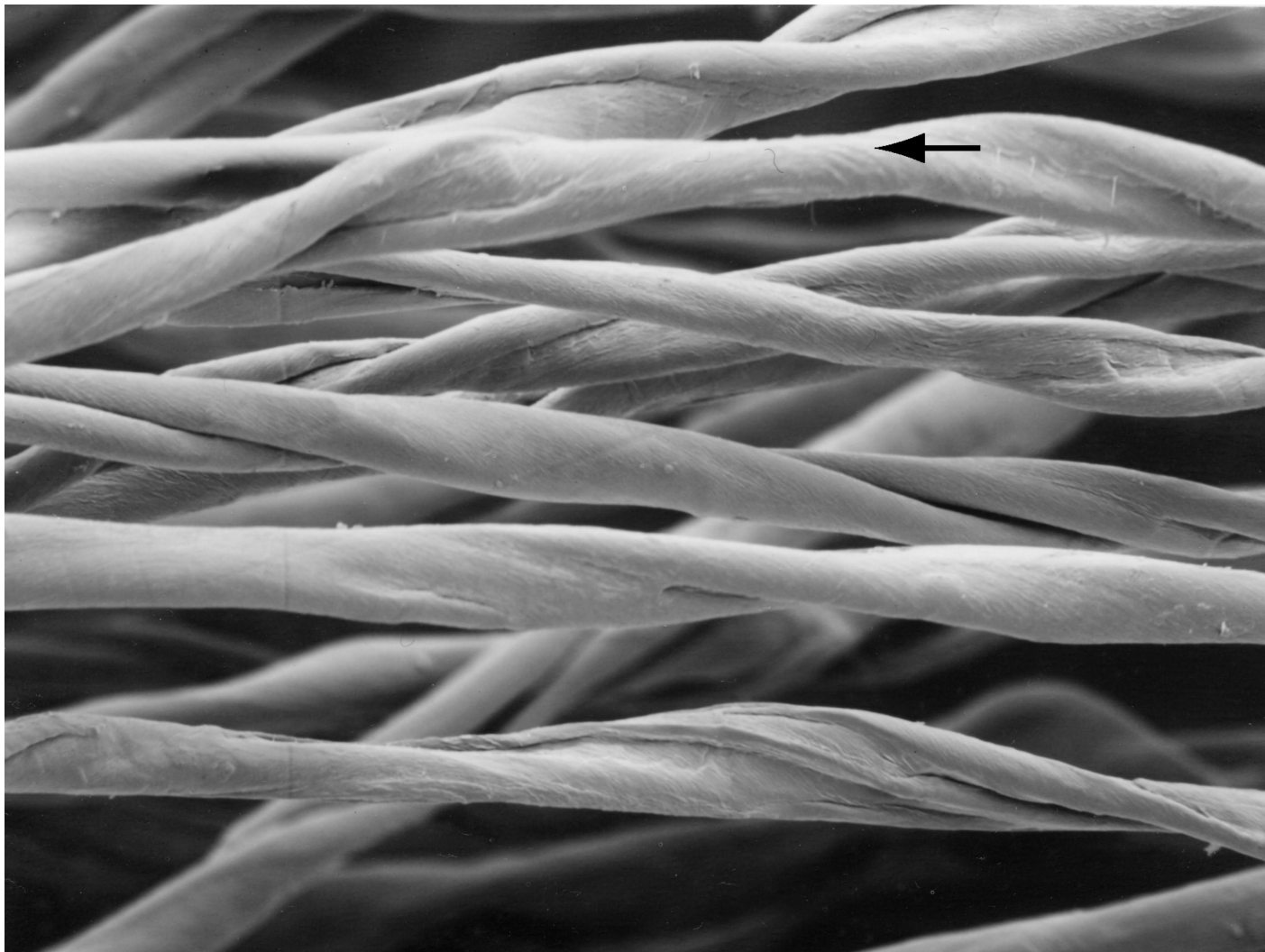
Fiber nep



SEM of a yarn nep

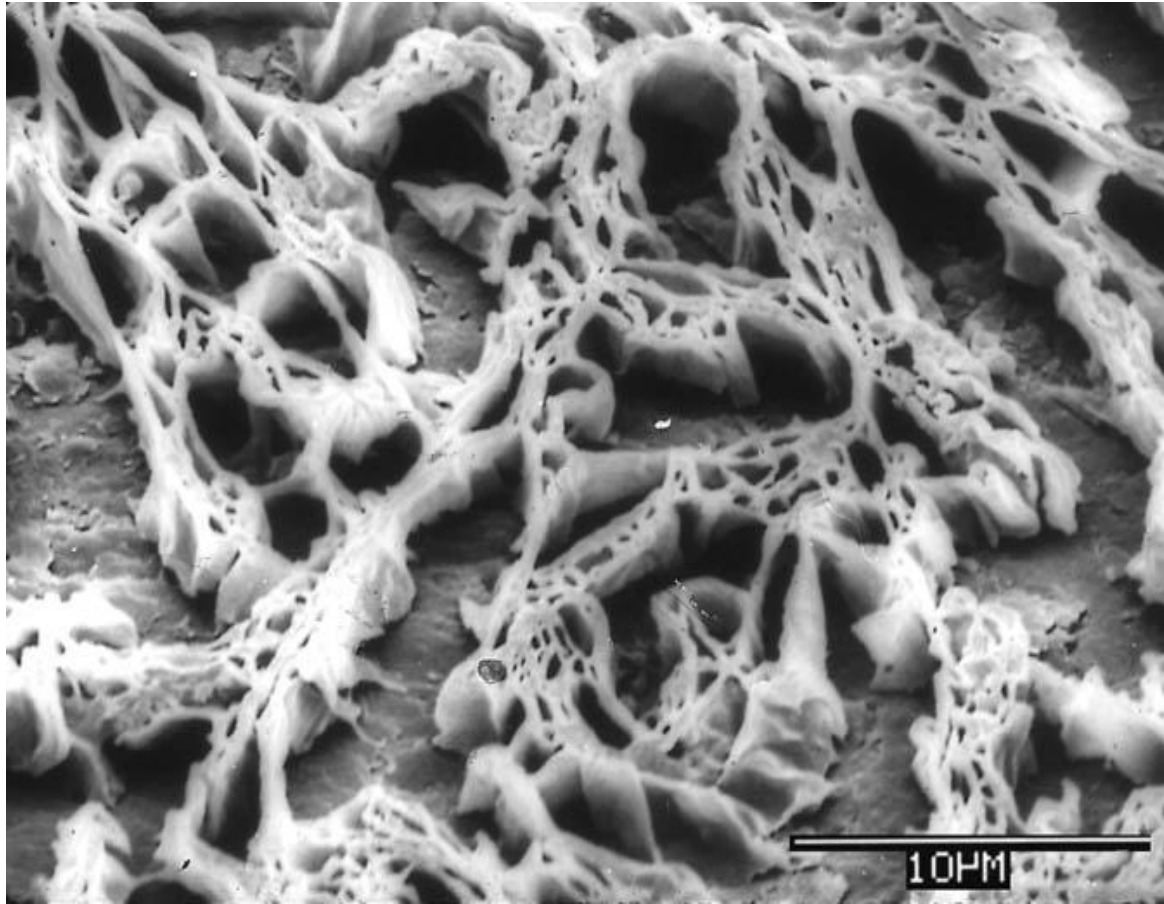


SEM of mature fibers



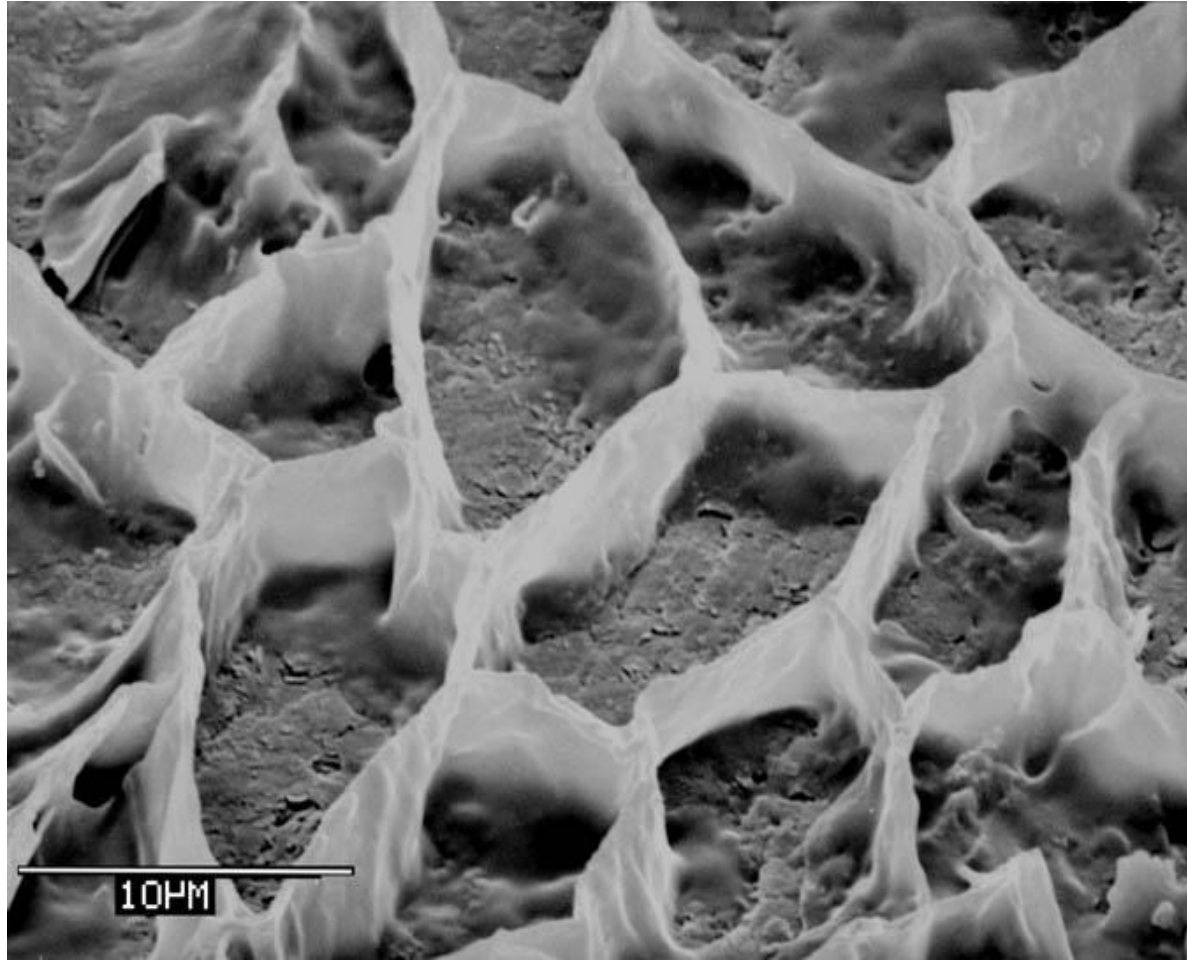
SEM of immature fibers





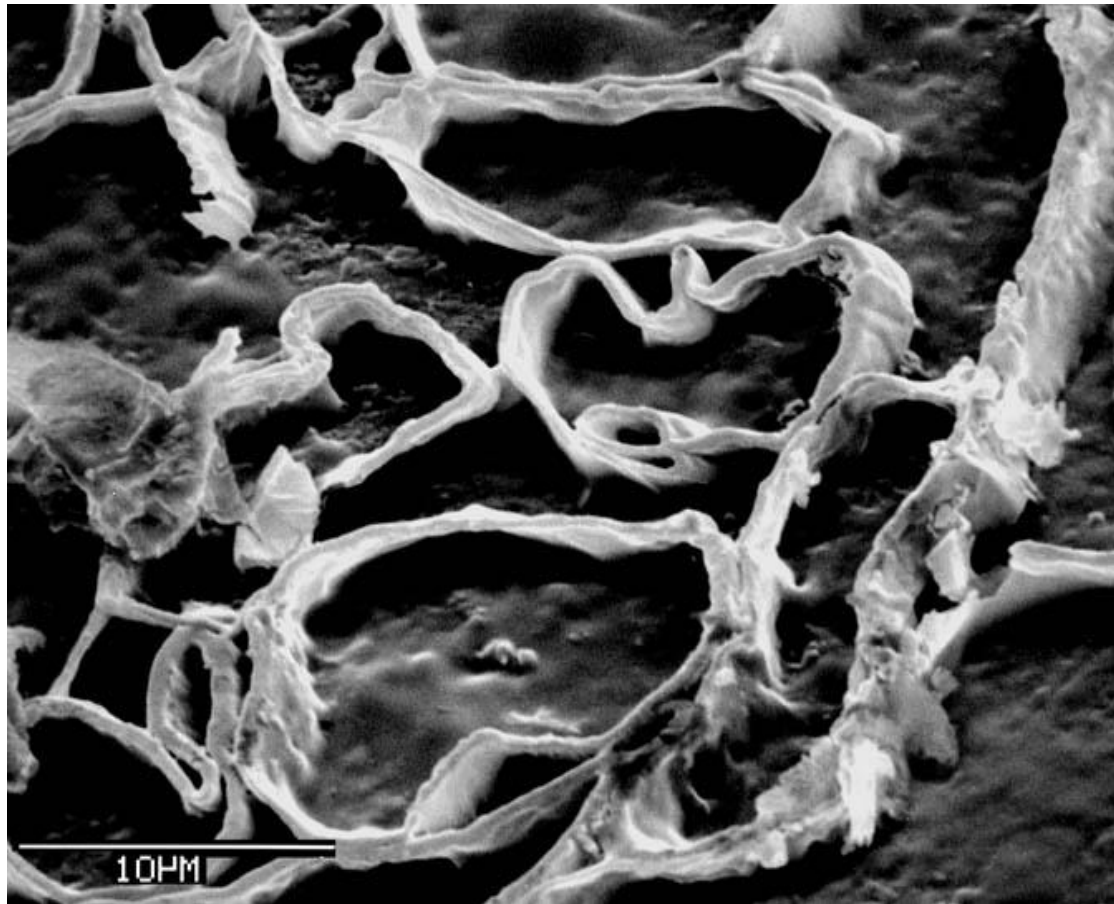
**15 day fiber bundle cross section
showing thin primary walls of fibers
that are adhering to each other**

Picture: R. Goynes



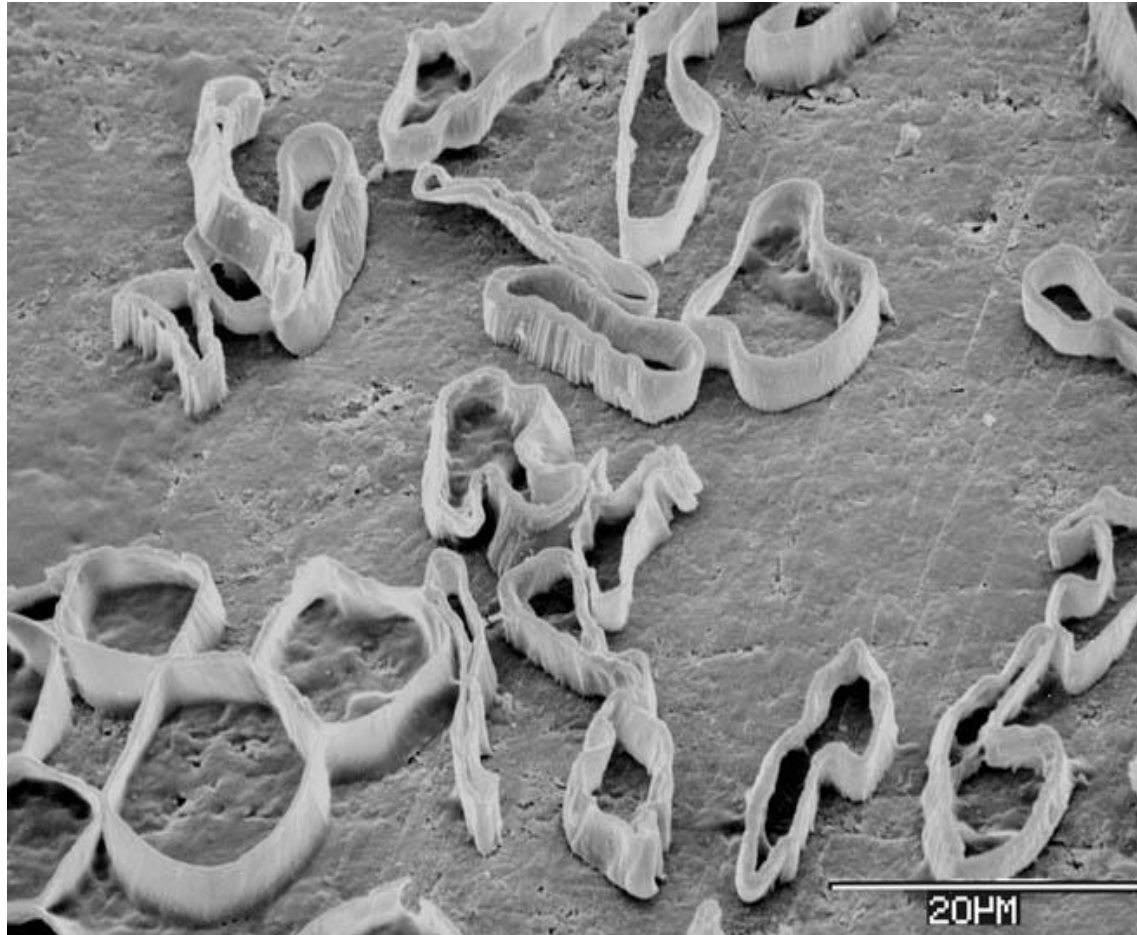
Developing fiber bundle cross section showing better developed primary walls

Picture: R. Goynes



Fiber bundle cross section showing that as the secondary wall development begins, fibers separate to show individual walls

Picture: R. Goynes



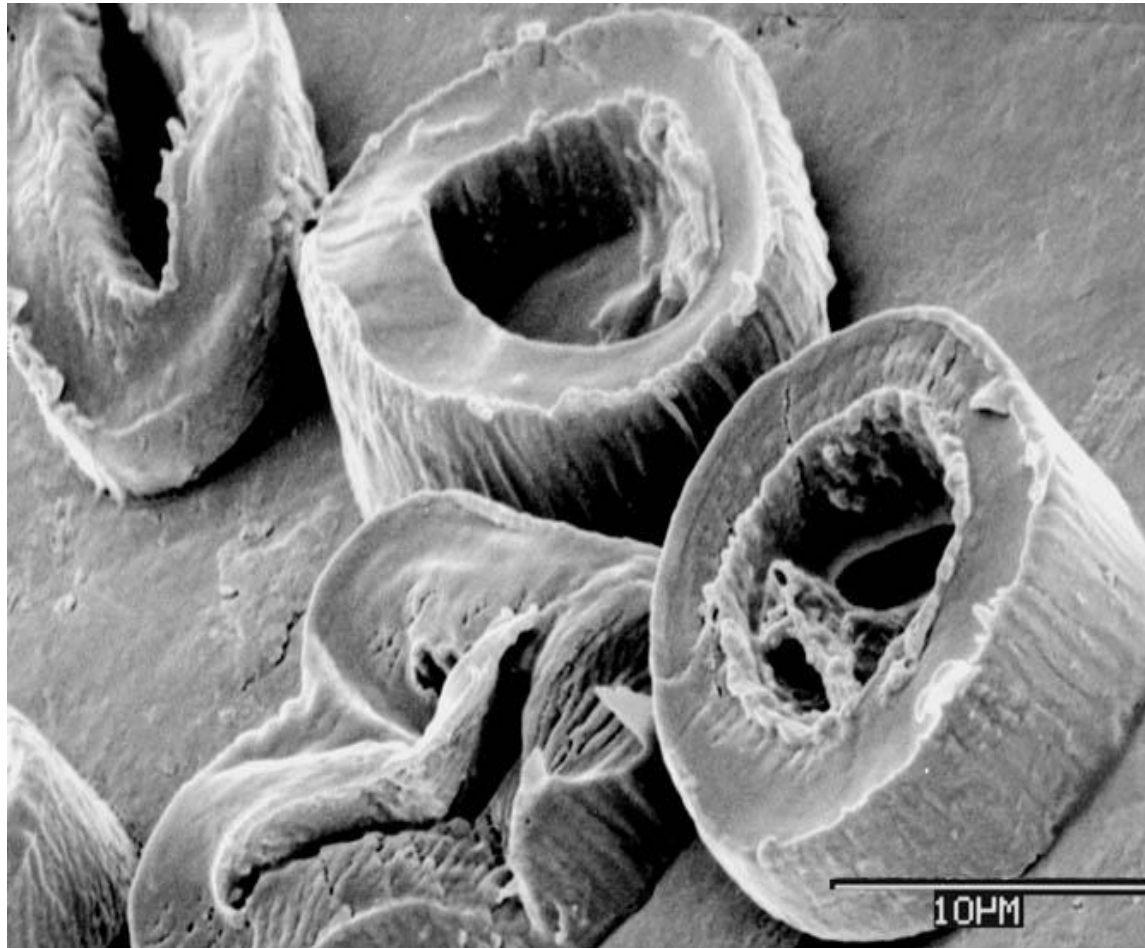
Fiber bundle cross section at stage of development where fibers are individual entities

Picture: R. Goynes



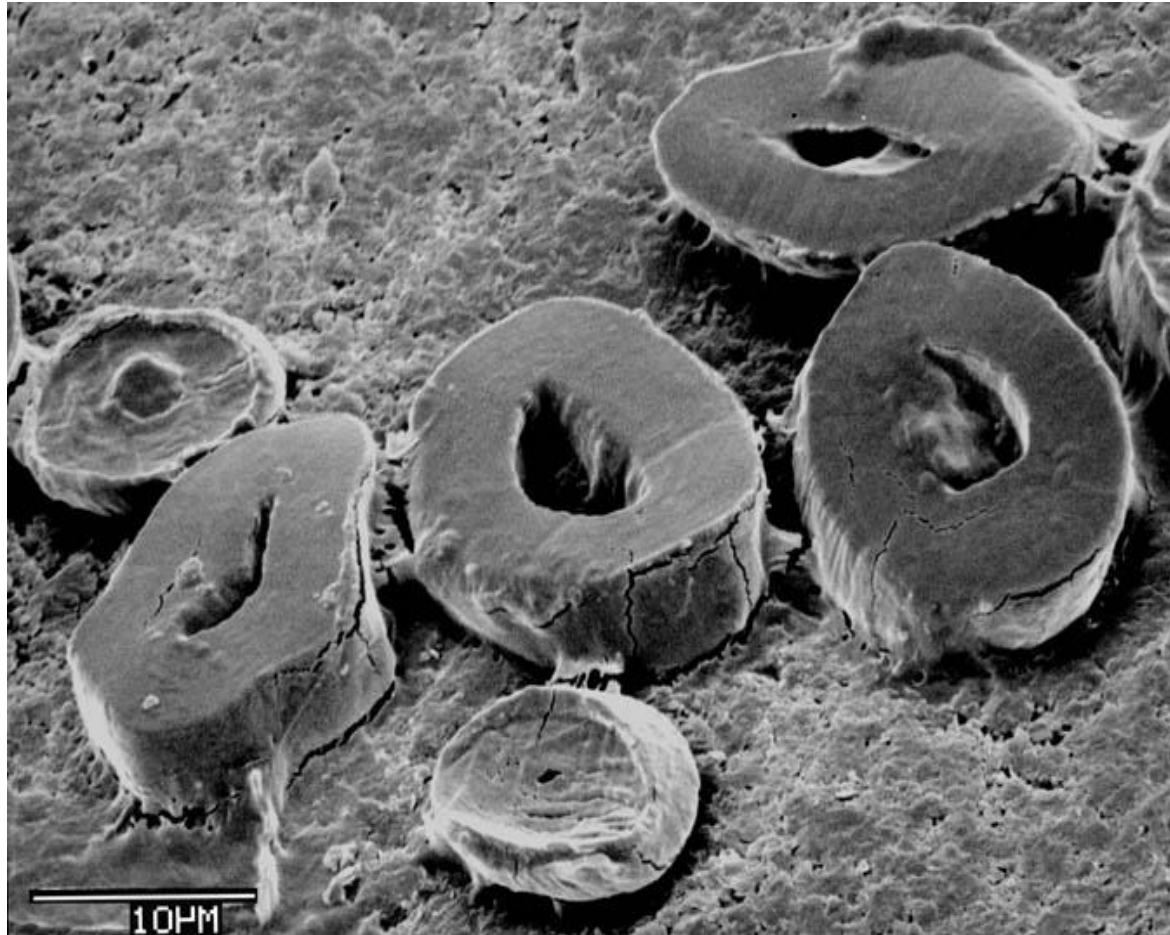
At 25-day development under normal growing conditions, fiber cross sections show increasing secondary wall thickness

Picture: R. Goynes



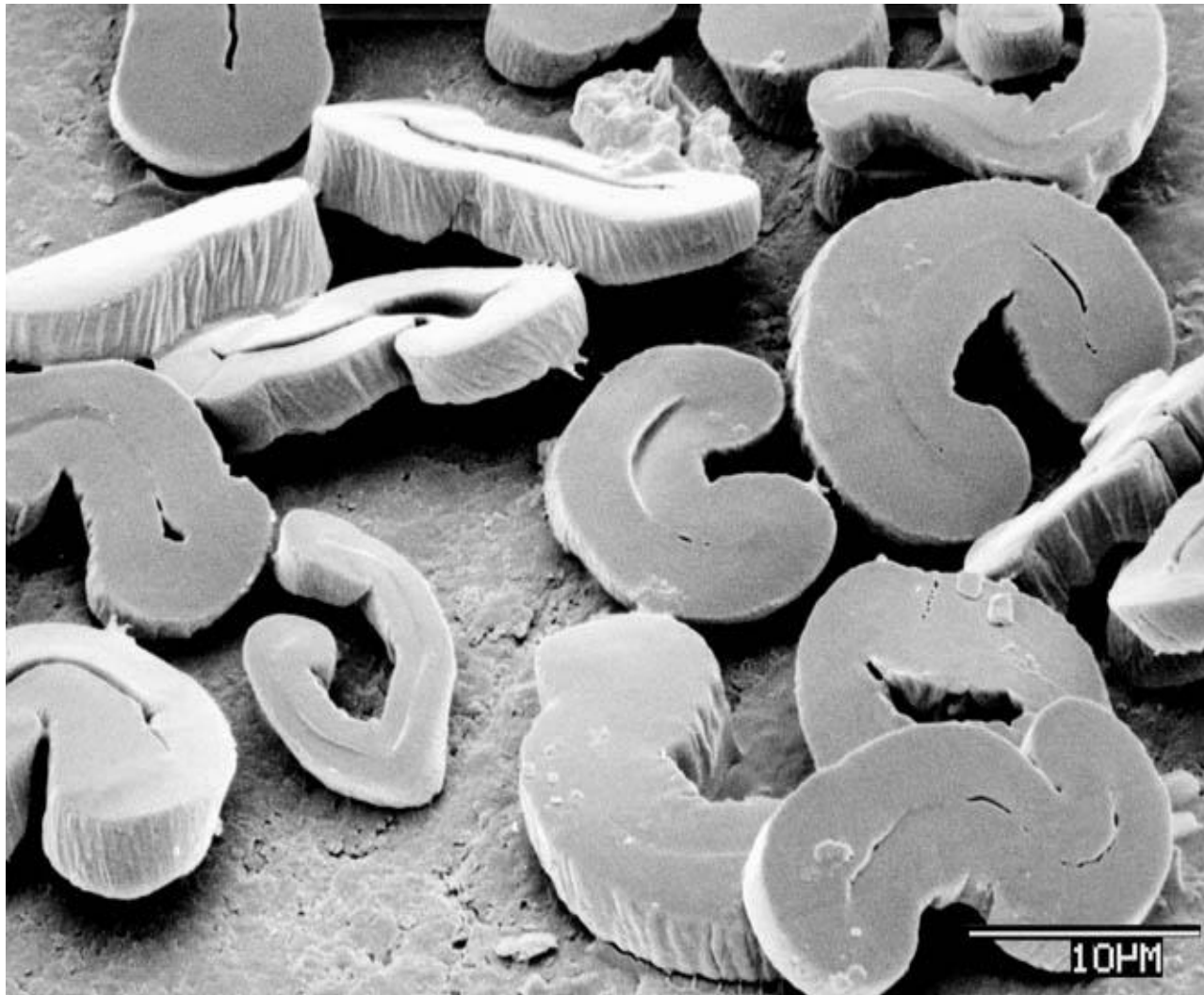
35-day fiber cross sections show increasing wall development that is nearing completion

Picture: R. Goynes



**Fully developed fibers [49 days]
preserved in their round circular
structure**

Picture: R. Goynes



Mature, field dried fiber cross sections

Picture: R. Goynes

100% cotton fabric (same variety, same field)

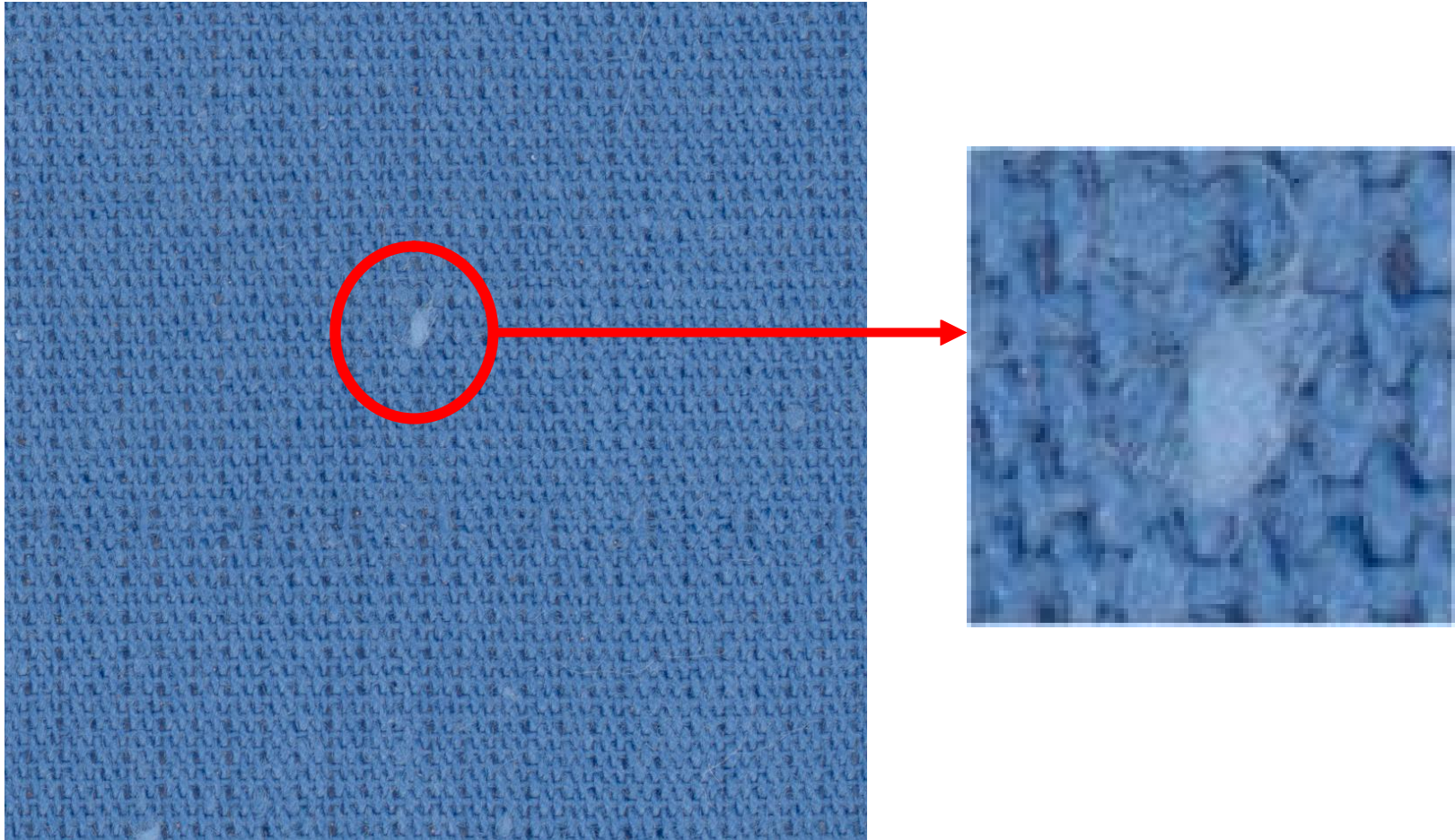
Mature cotton



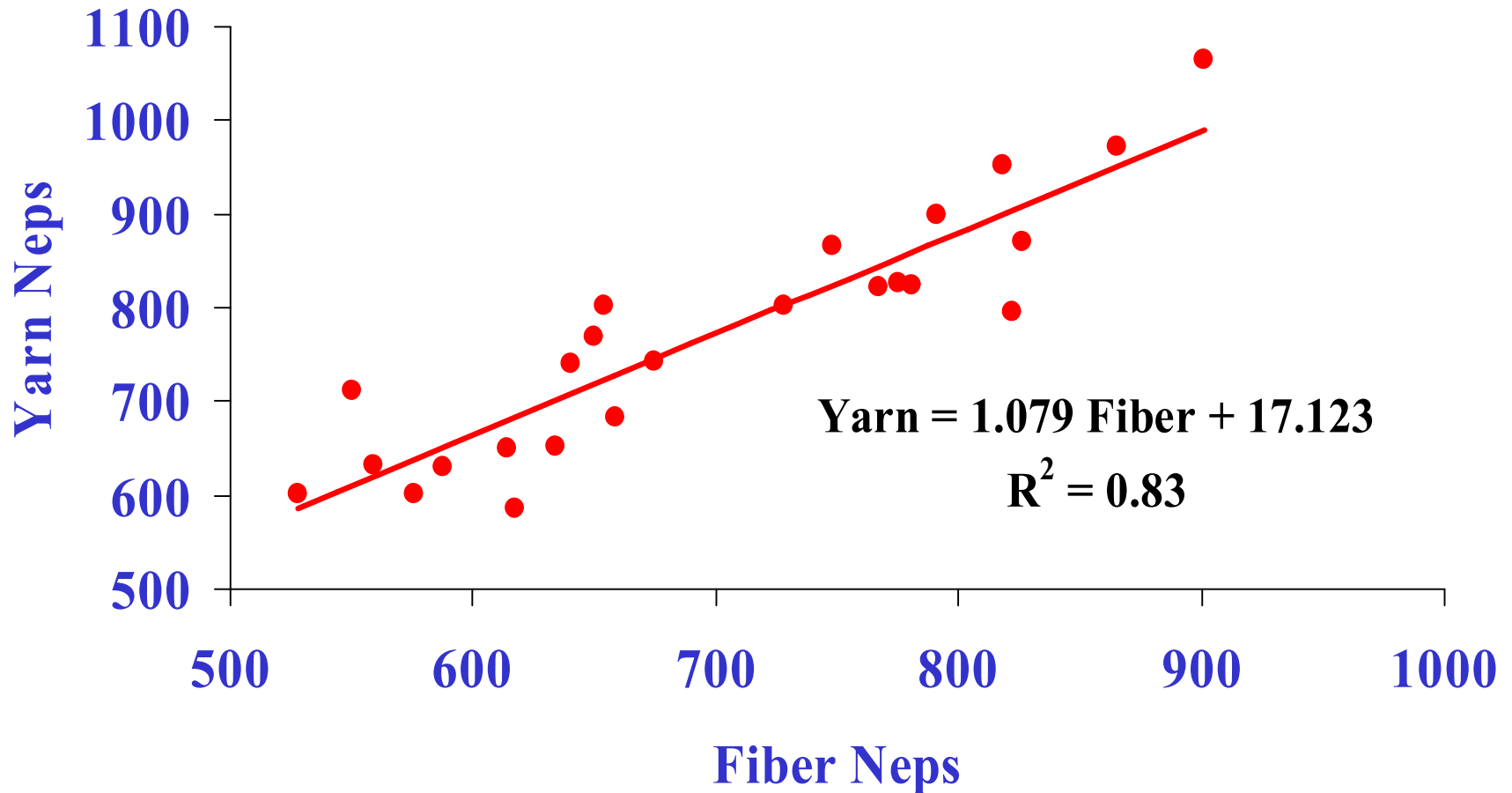
Immature cotton



Shiny nep on fabric



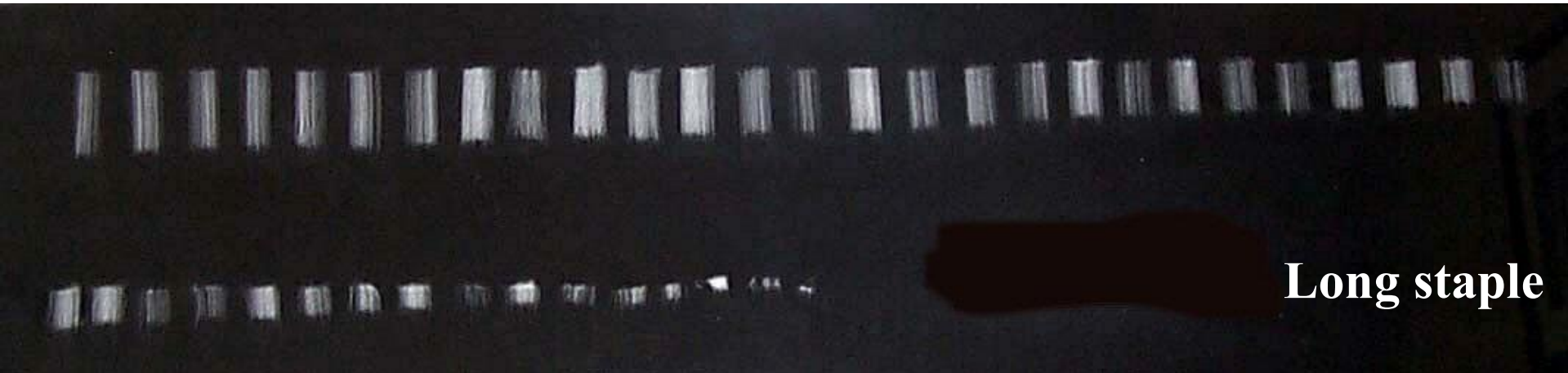
Yarn neps RS 40Ne vs. Fiber neps



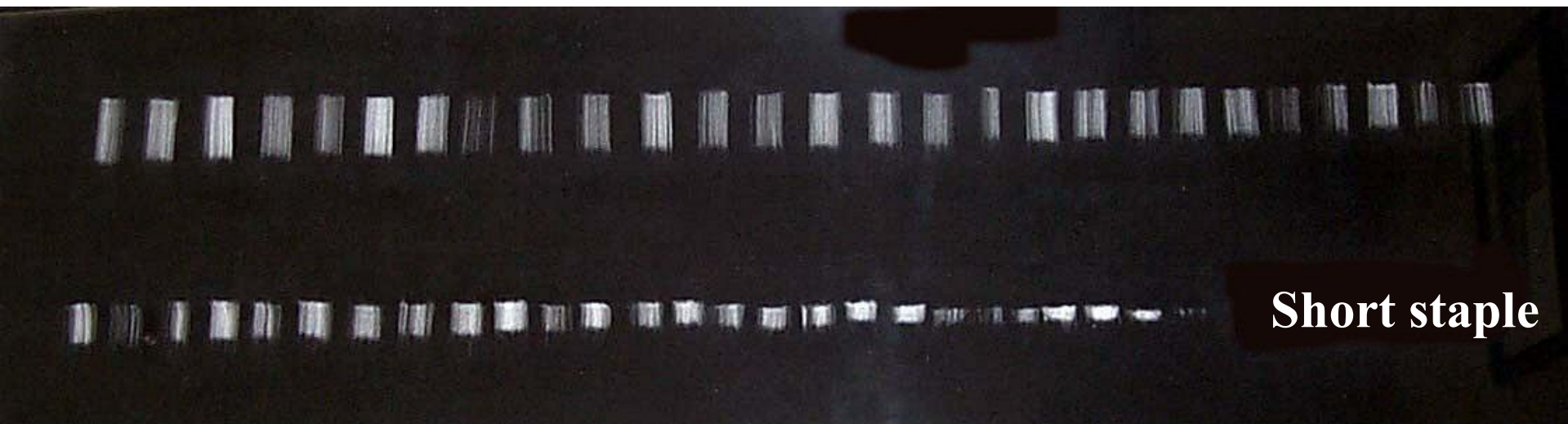
What is the Short Fiber Content?

- **Percentage, by weight, of fibers $\frac{1}{2}$ inch in length or shorter.**
- **Percentage, by number, of fibers $\frac{1}{2}$ inch in length or shorter.**

Sutter-Webb

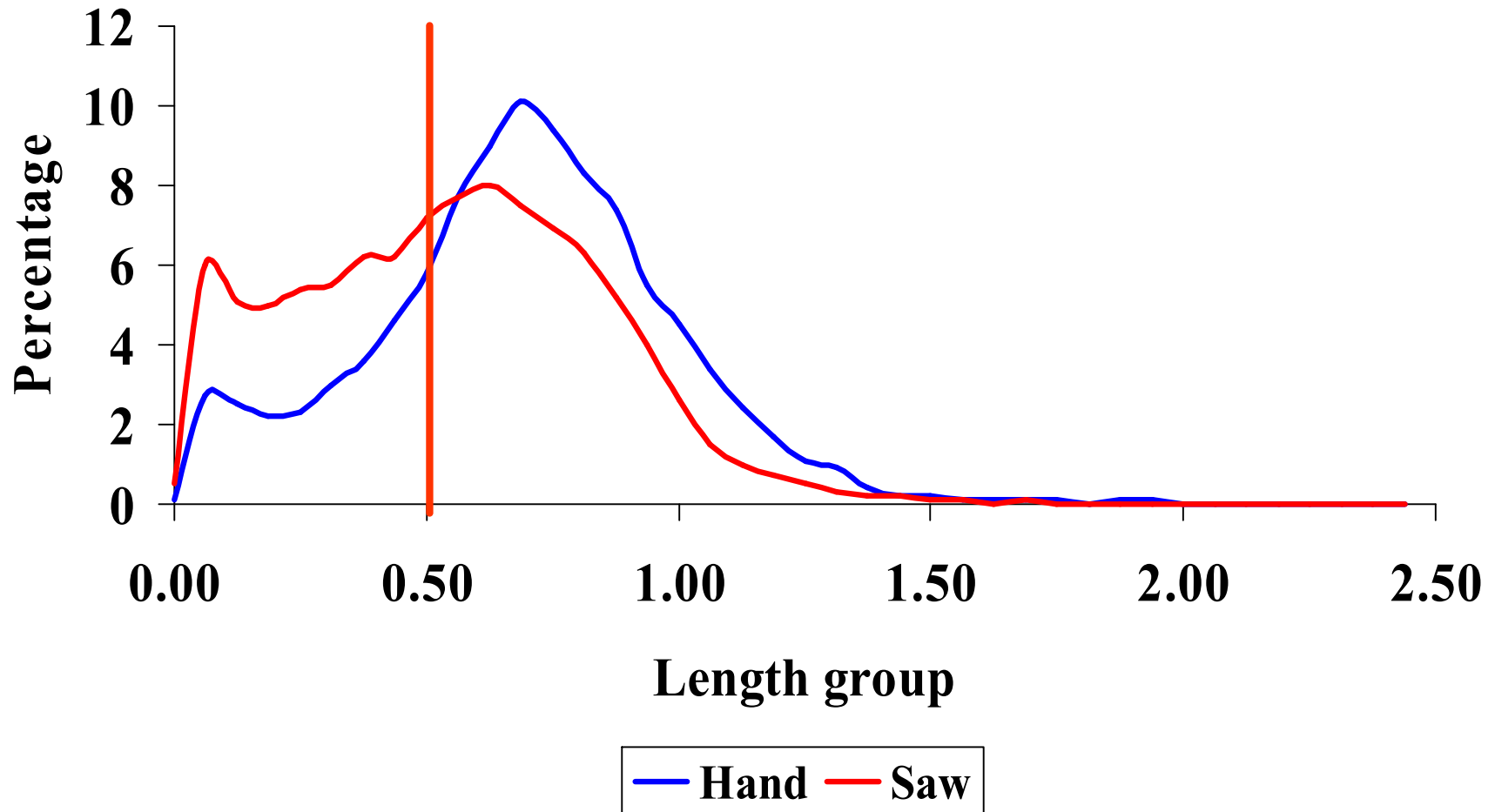


Long staple

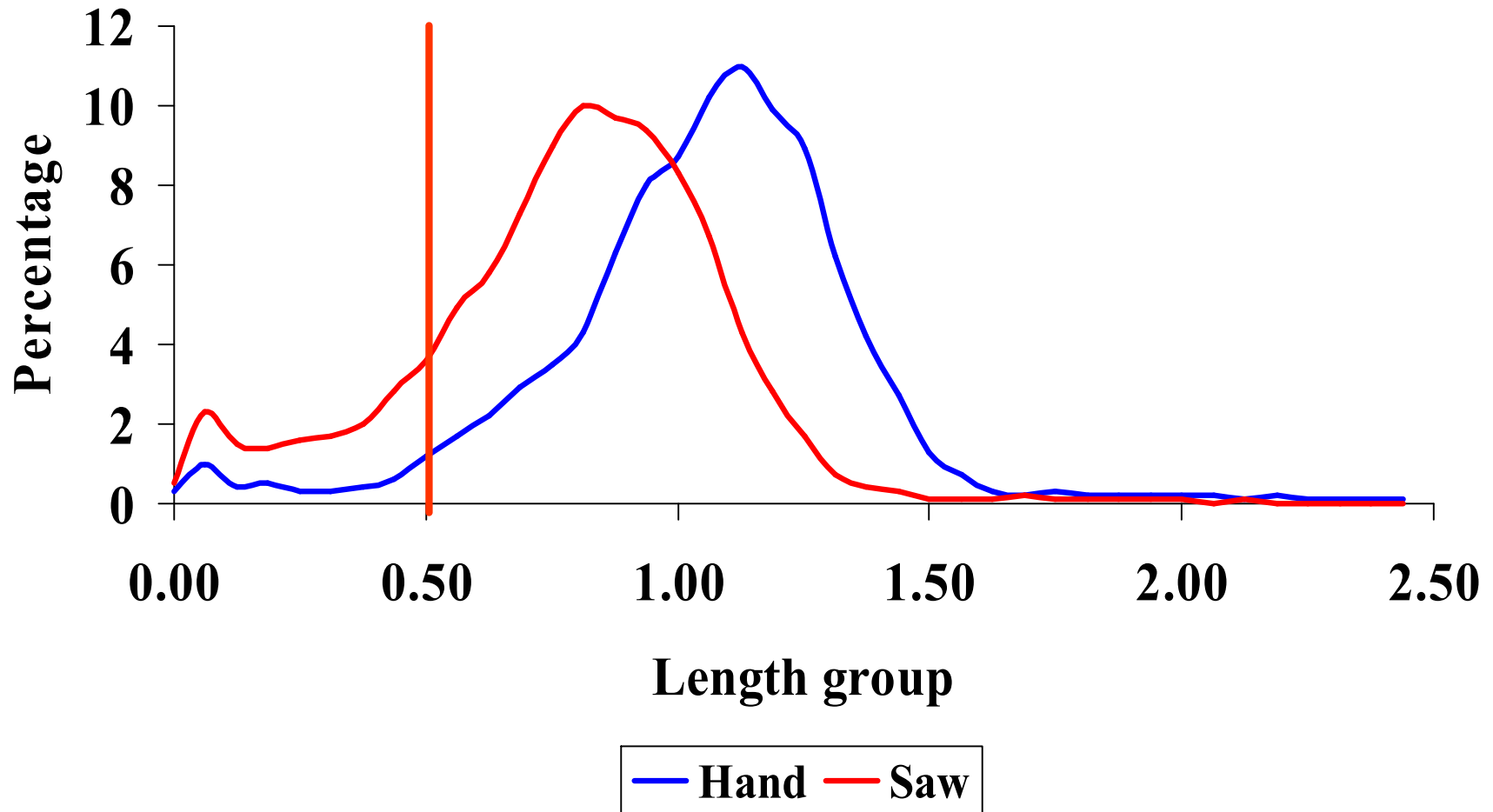


Short staple

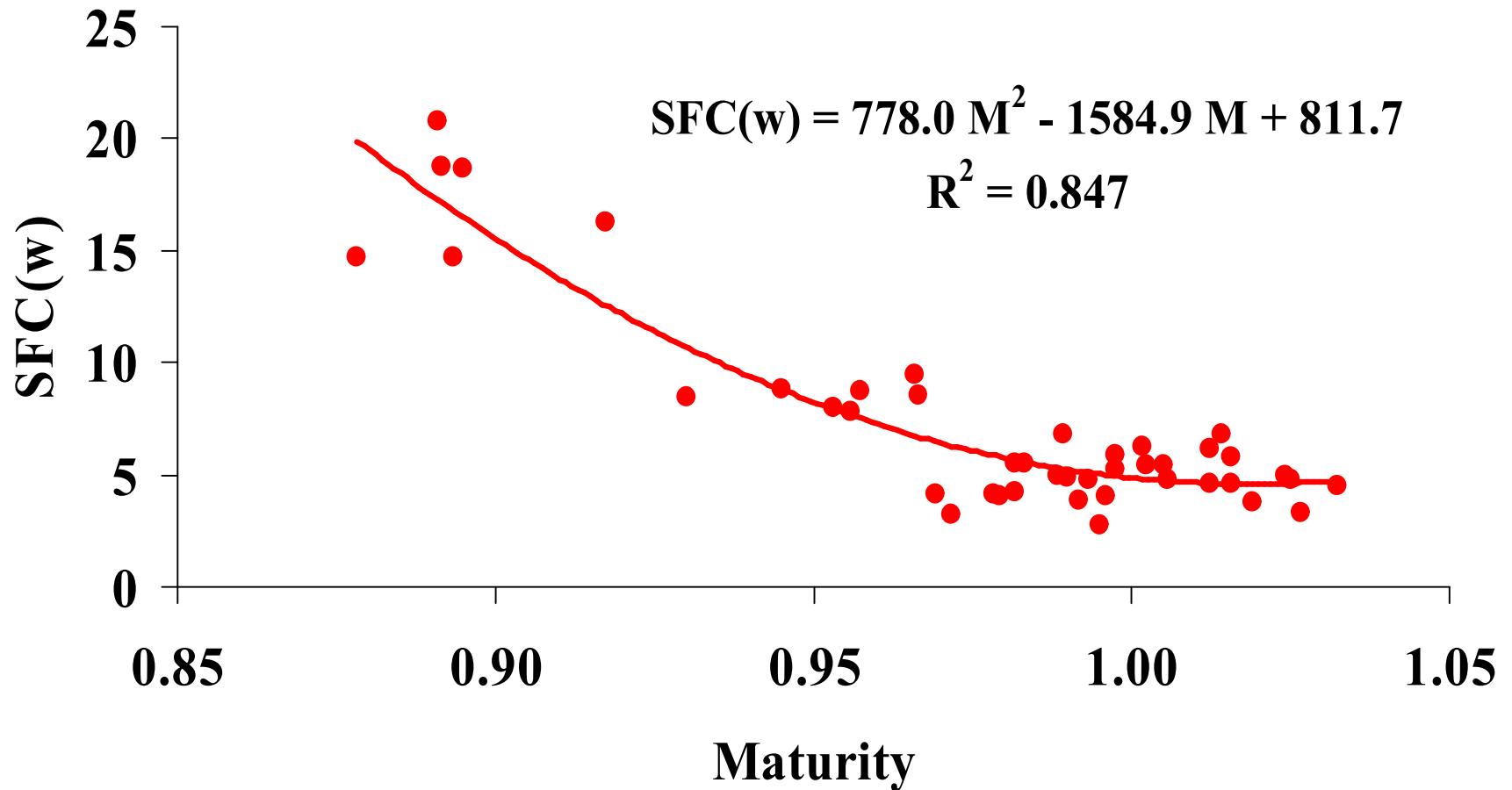
Sample 2403: Length distribution by number (Maturity ratio = 0.87)



Sample 1103: Length distribution by number (Maturity ratio = 1.04)



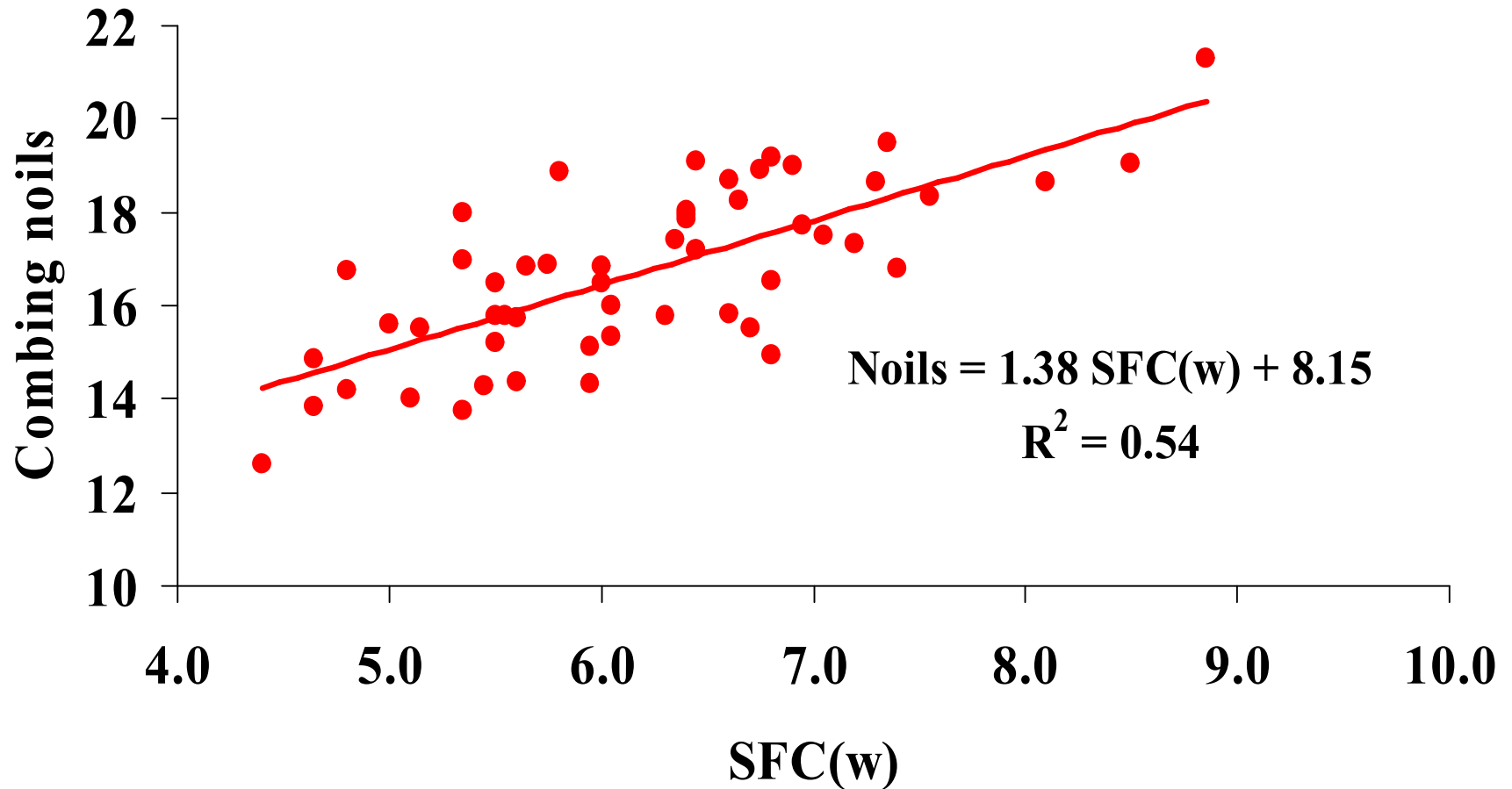
Short Fiber content (w) vs. Maturity



Why is it important?

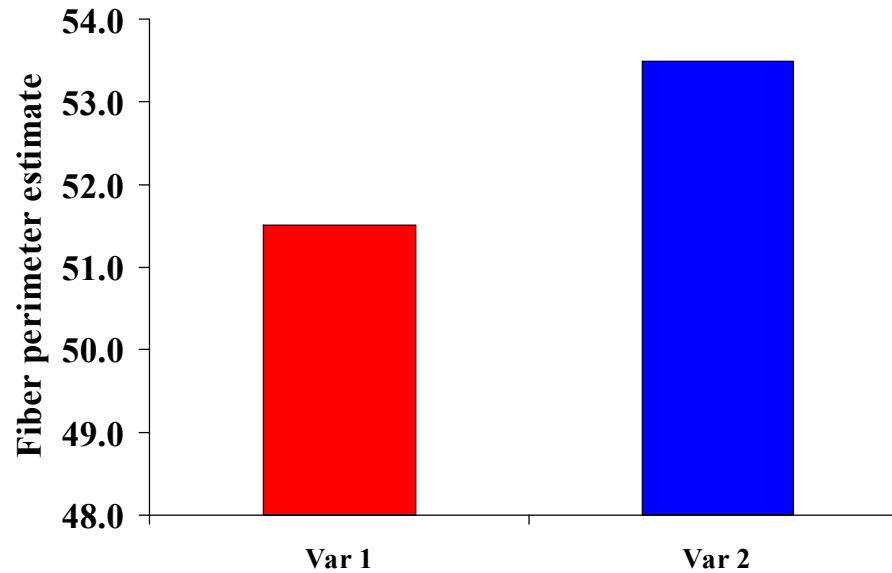
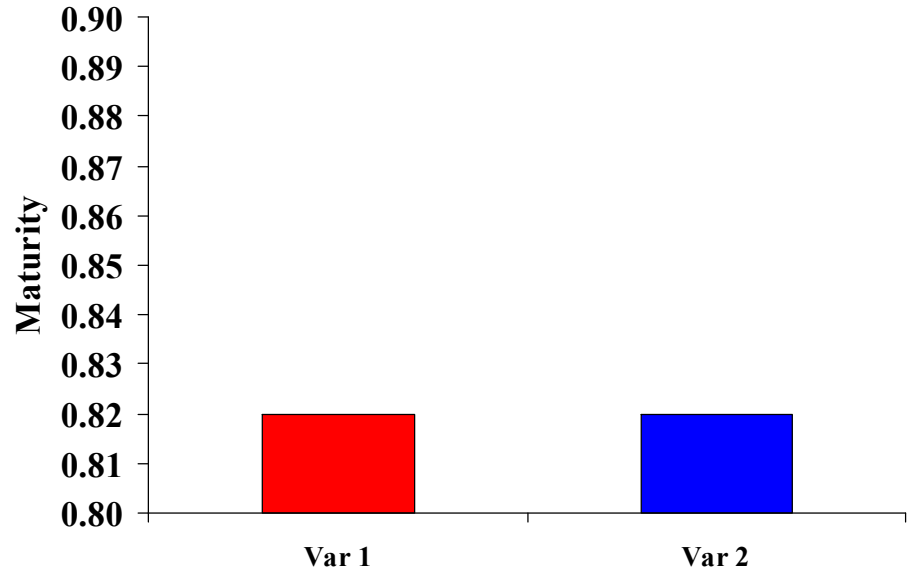
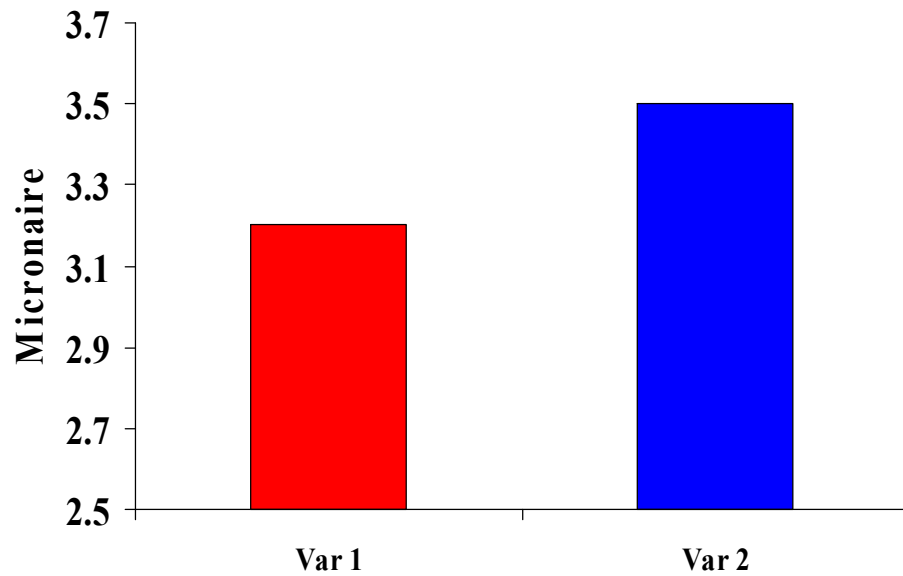
- **Higher SFC% results in higher loss at the carding machine.**
- **Higher SFC% results in more yarn defects and productivity loss.**
- **More yarn defects result in more fabric defects.**

Combing noils vs. Short Fiber content (w)

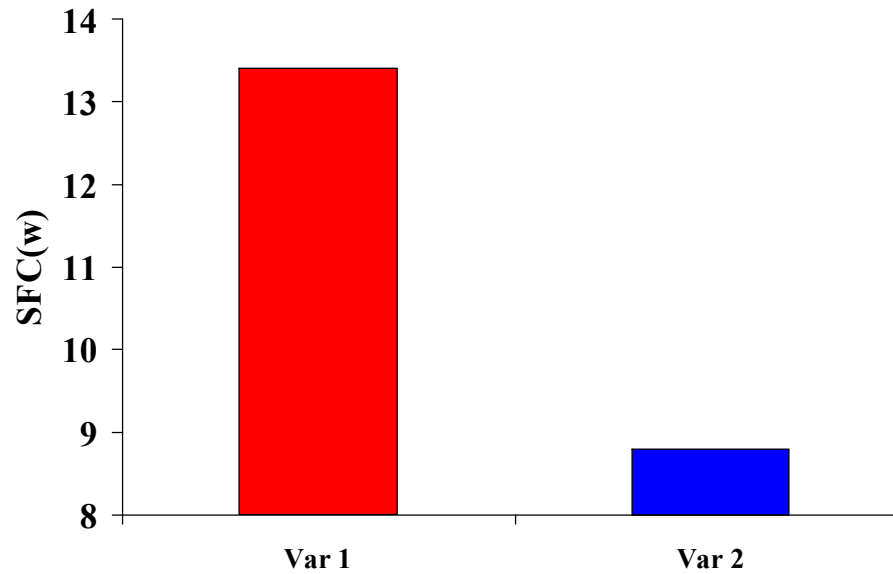
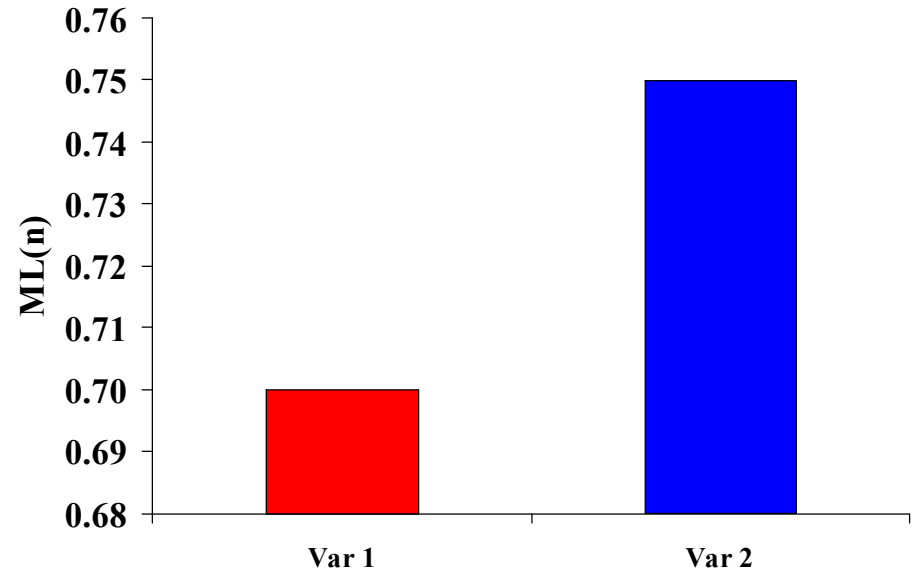
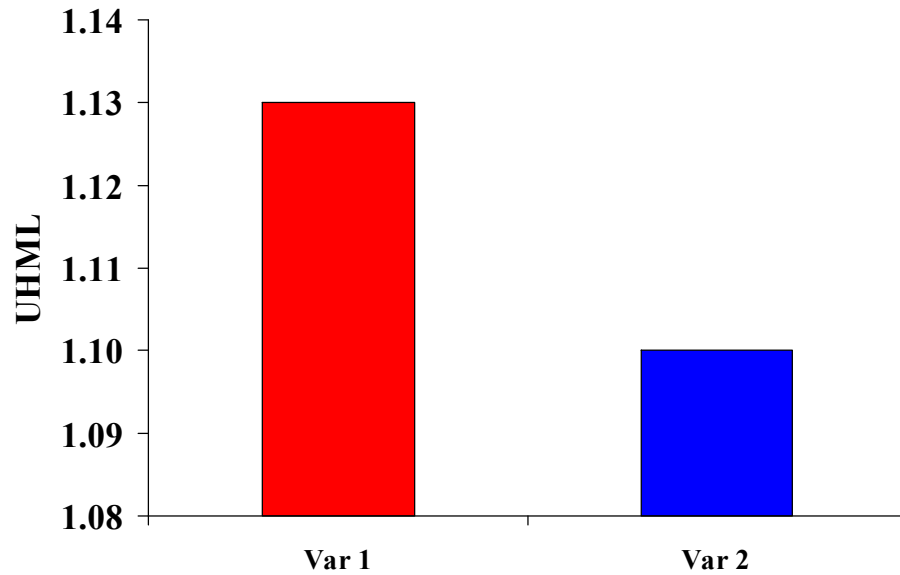


Fiber vs. Yarn: An example

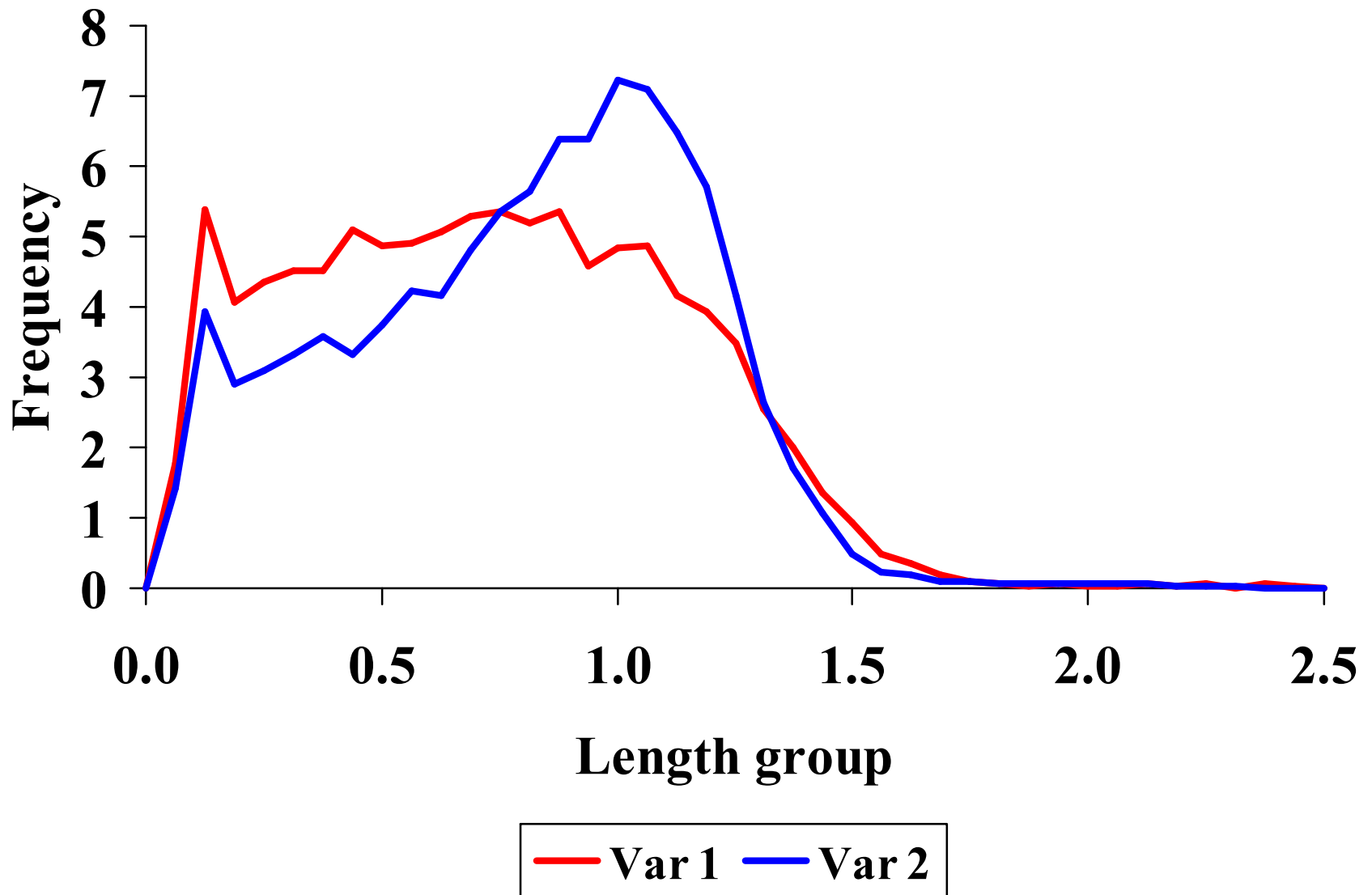
Micronaire, Maturity and Perimeter



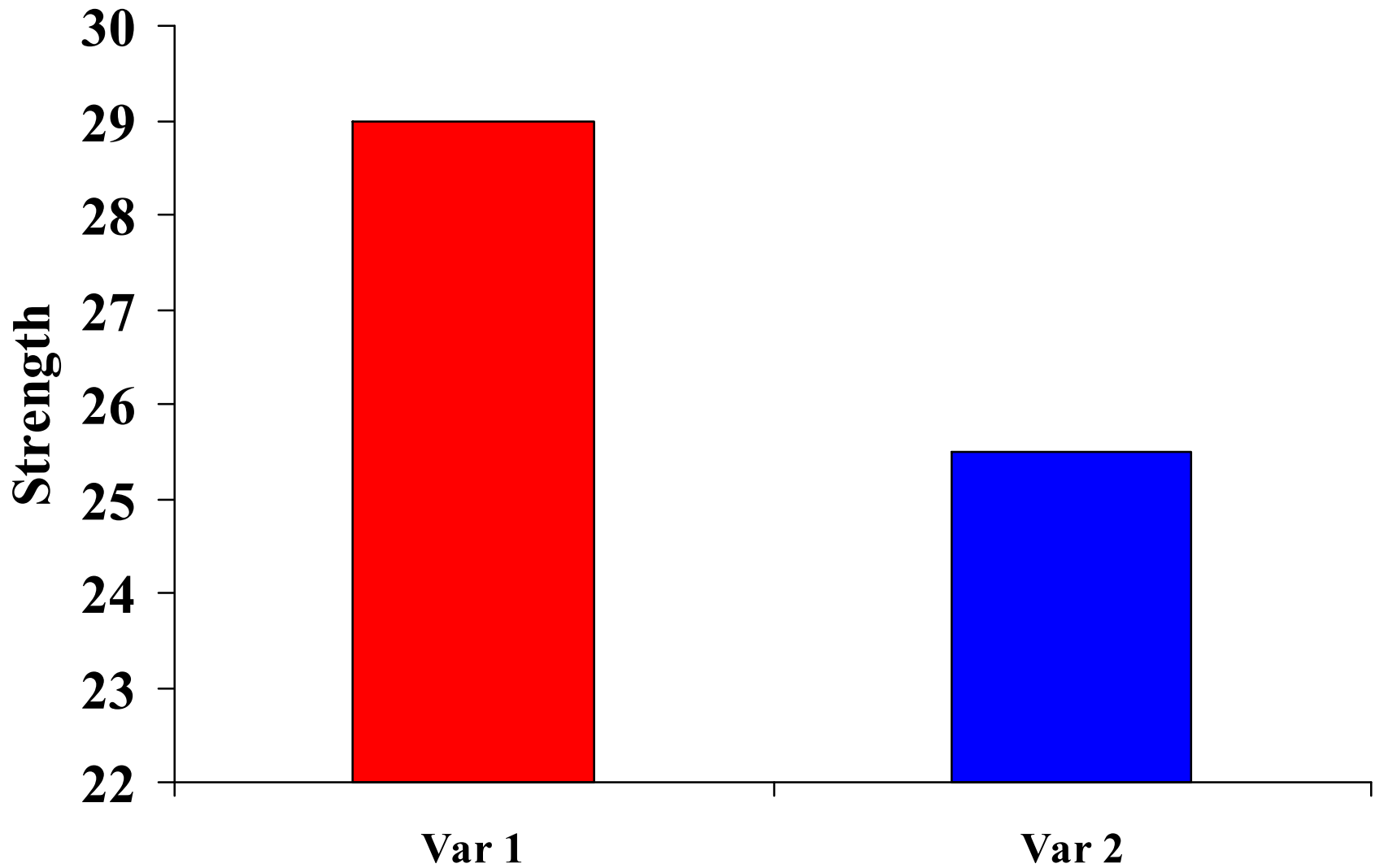
Length parameters



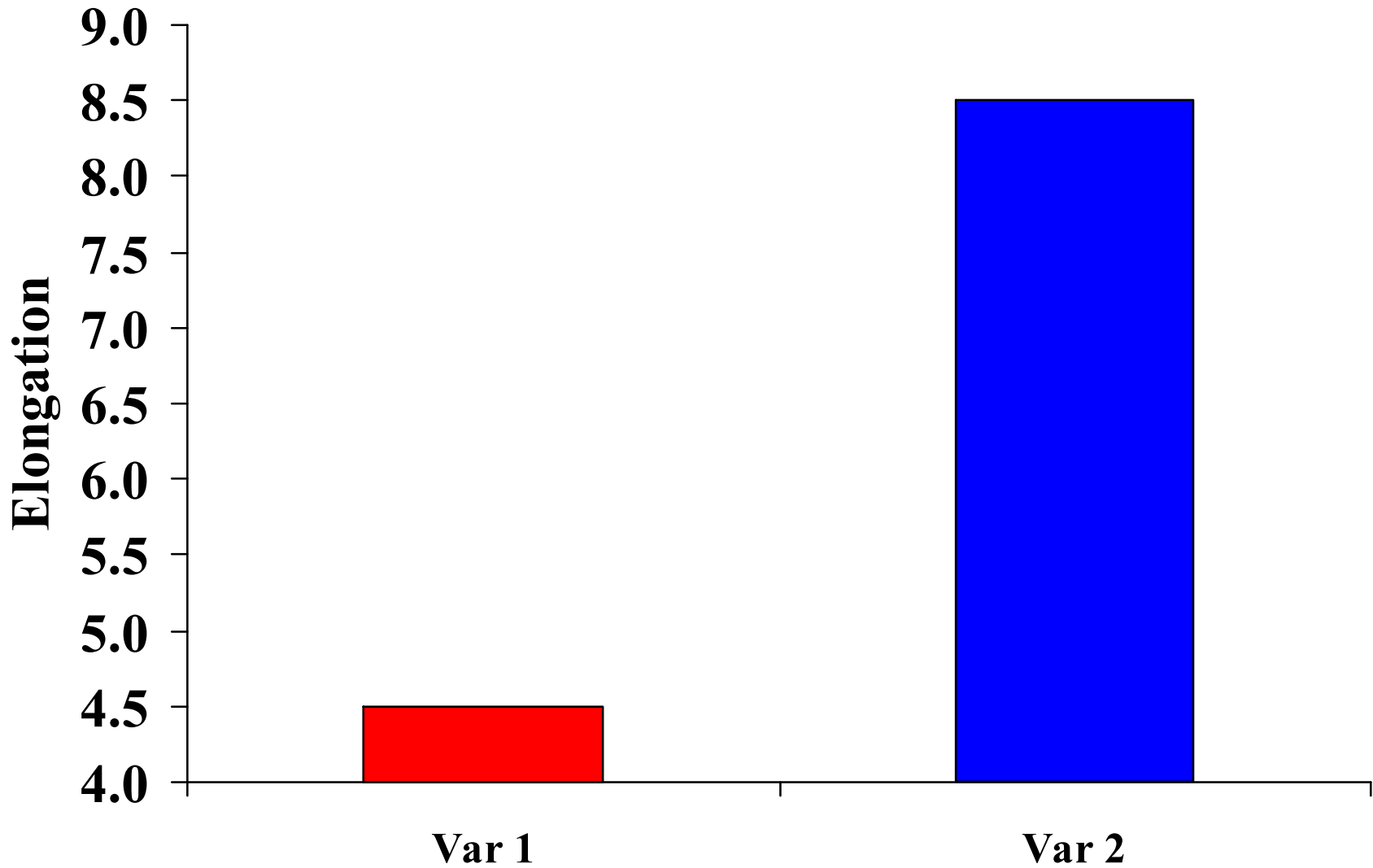
Length by number distributions



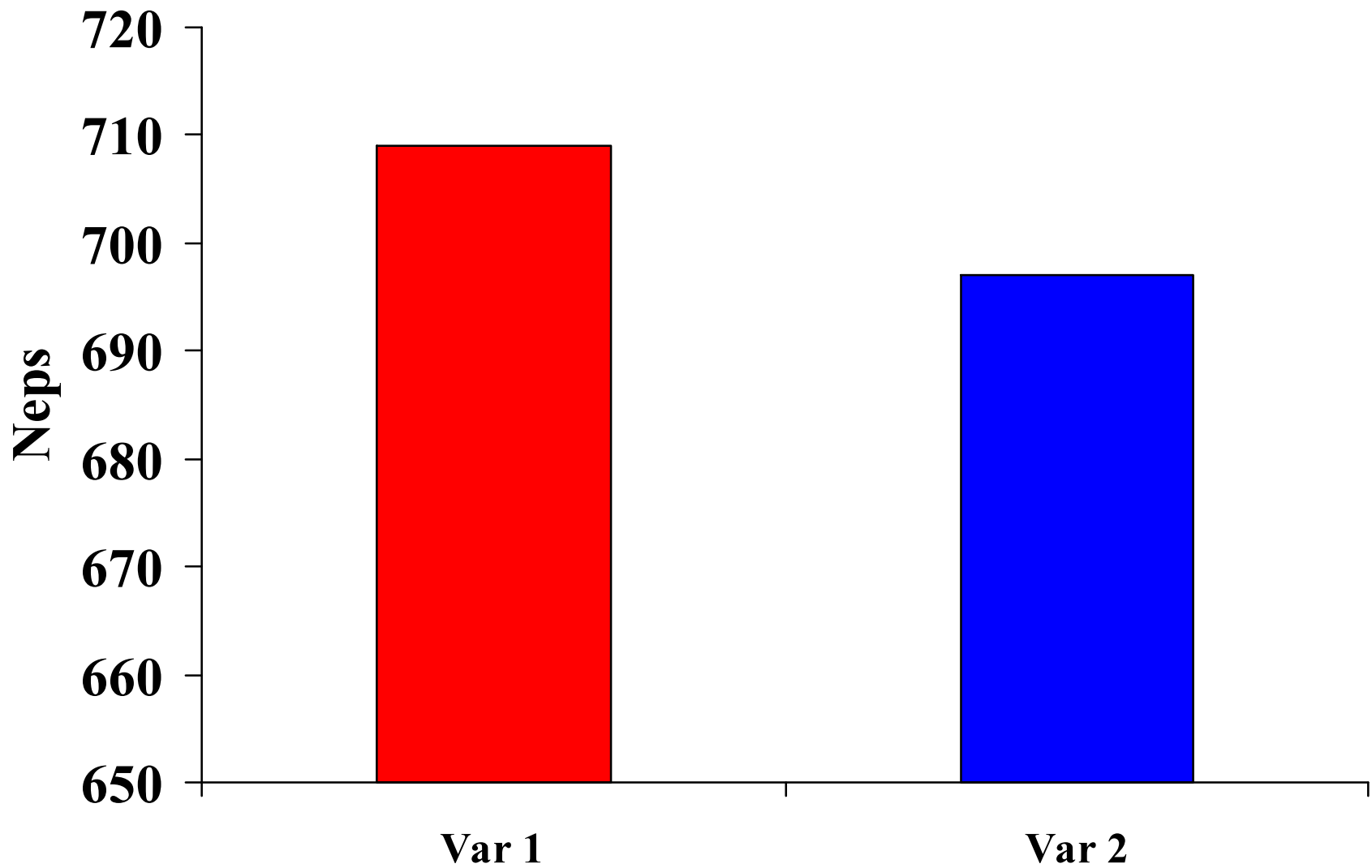
Variety test: Strength



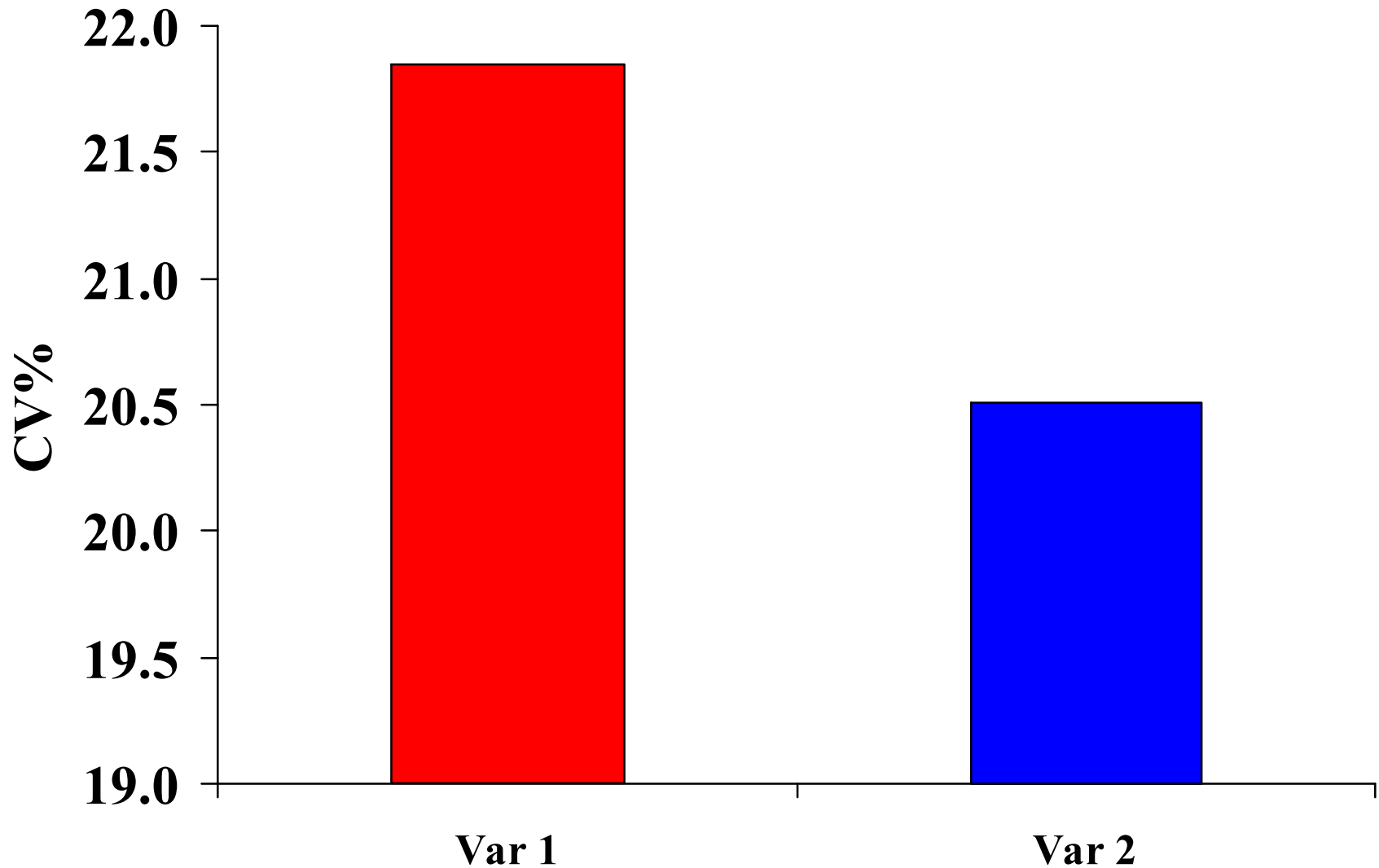
Variety test: Elongation



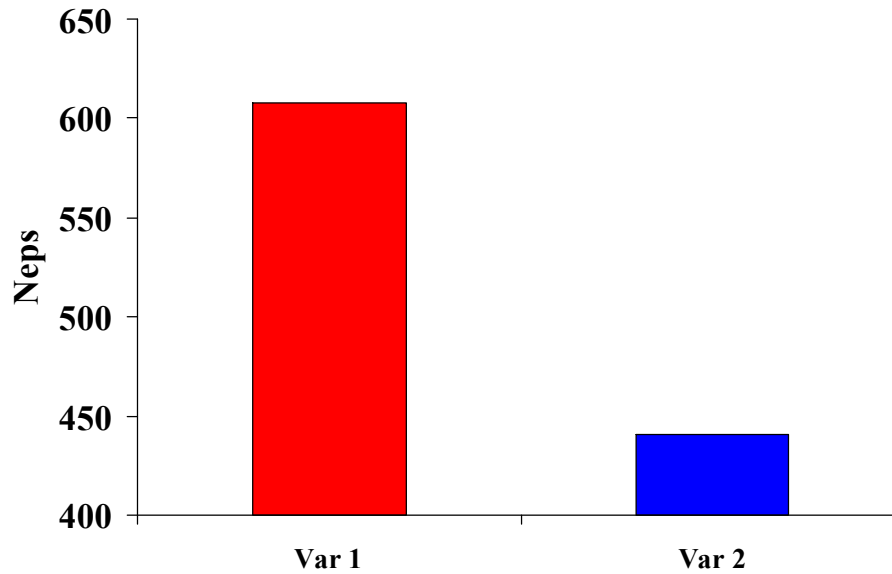
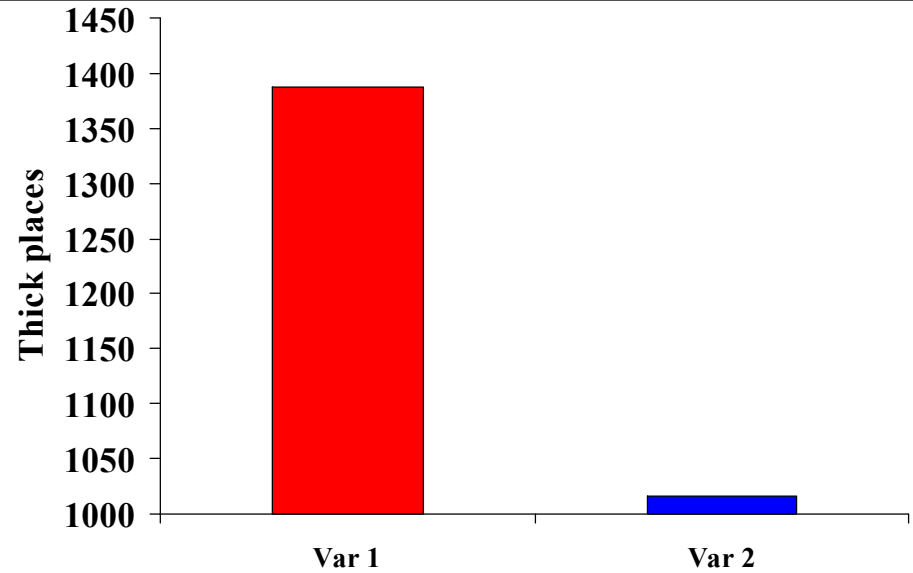
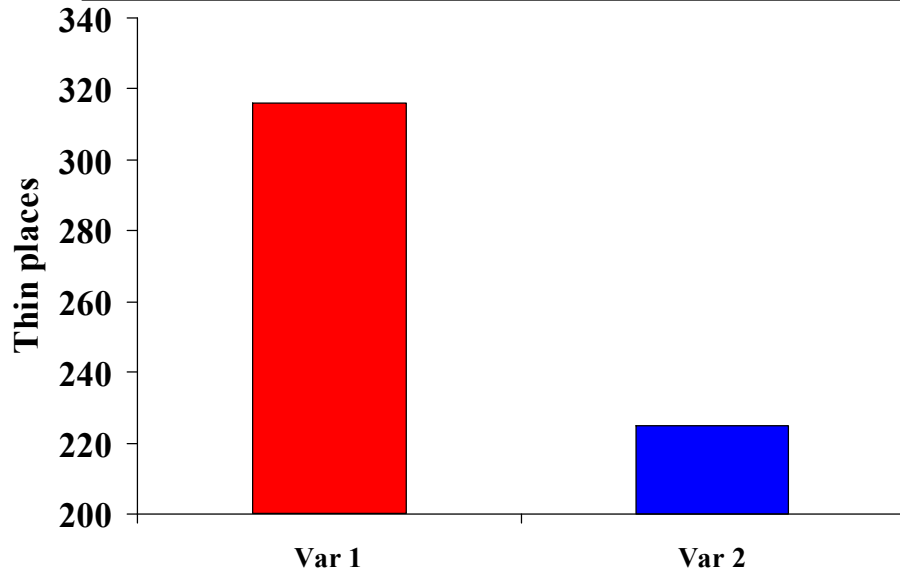
Variety test: AFIS Neps



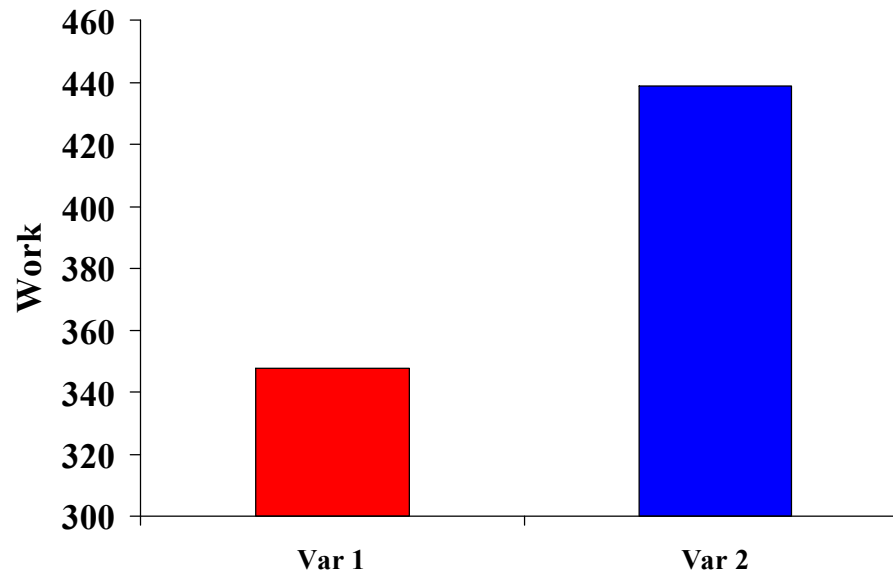
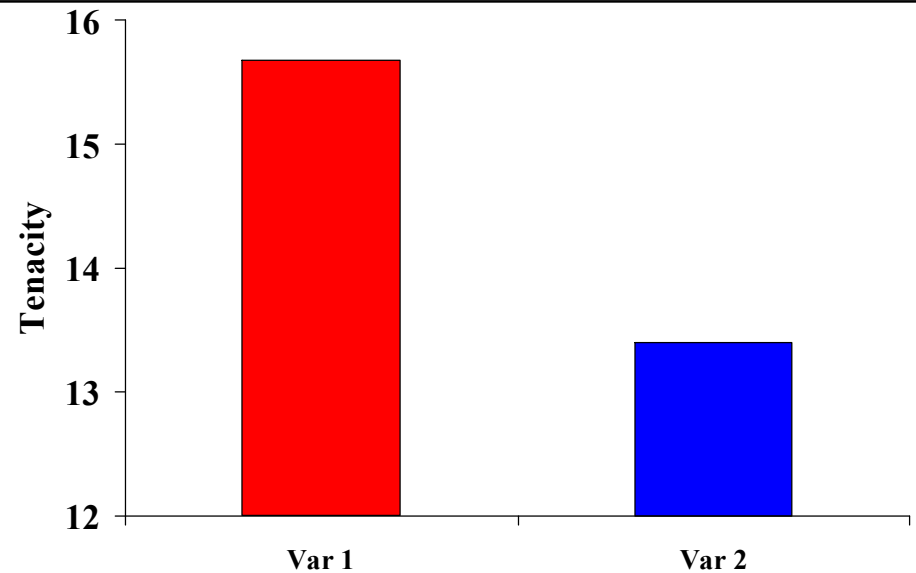
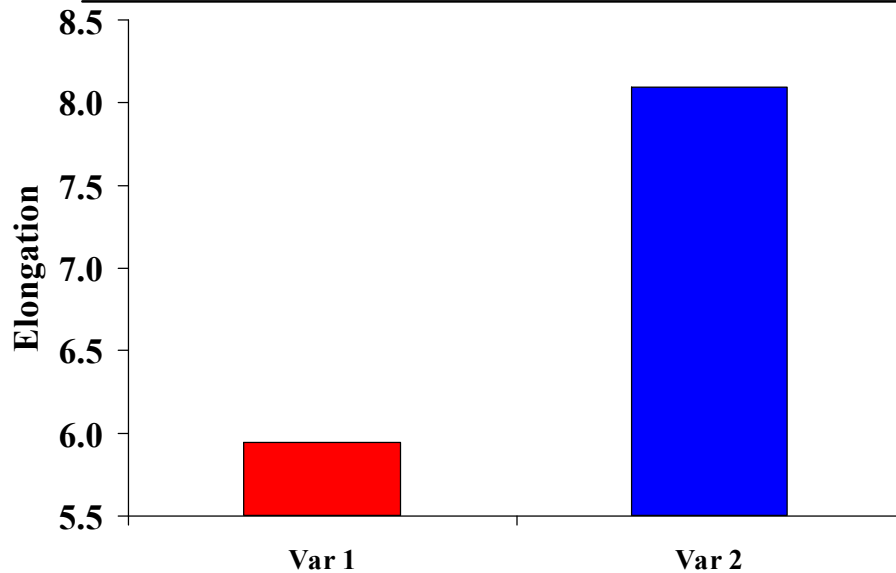
Ring spun yarn carded 40Ne: CV%



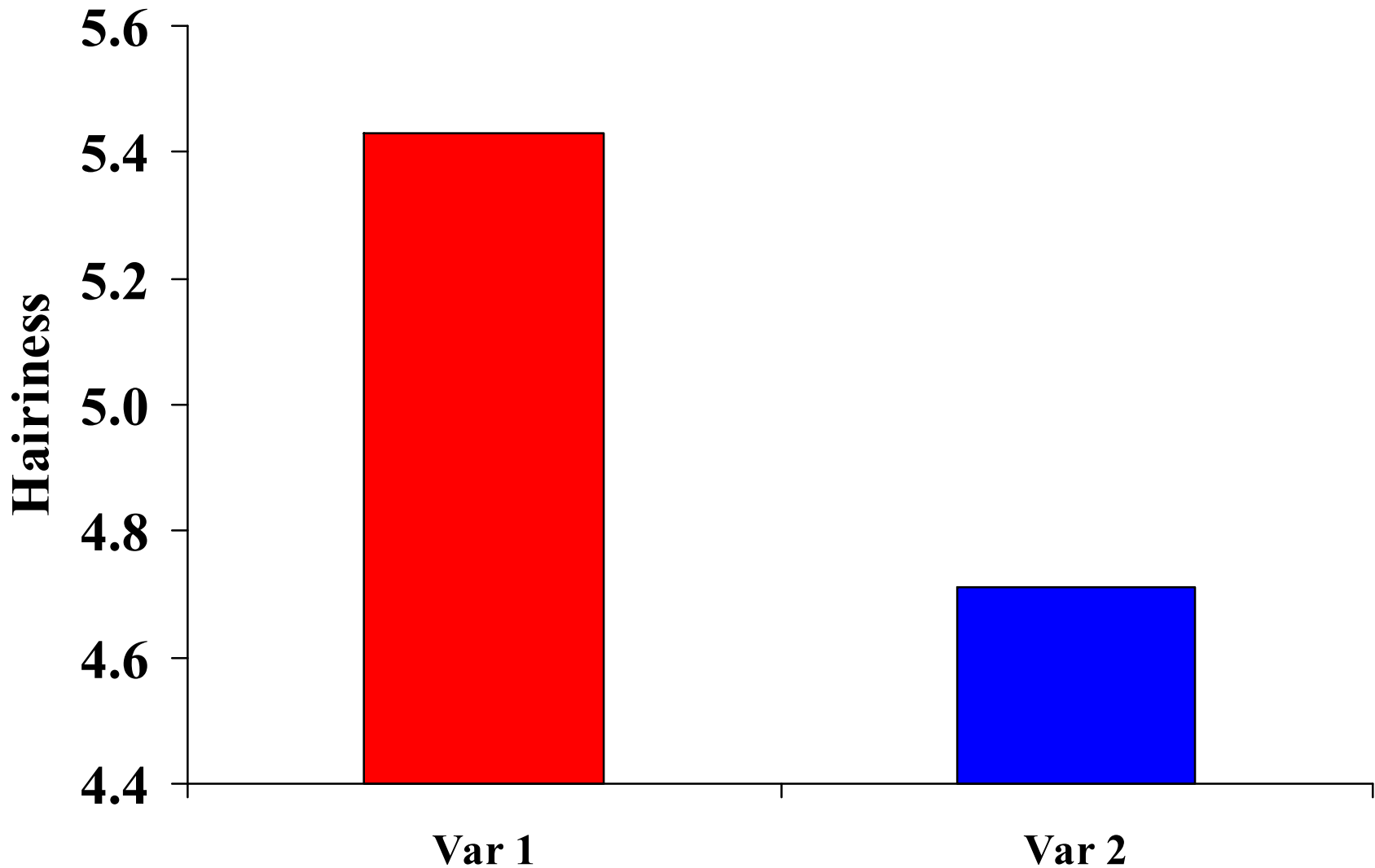
RS yarn 40Ne: Imperfections



RS yarn 40Ne: Tensile properties

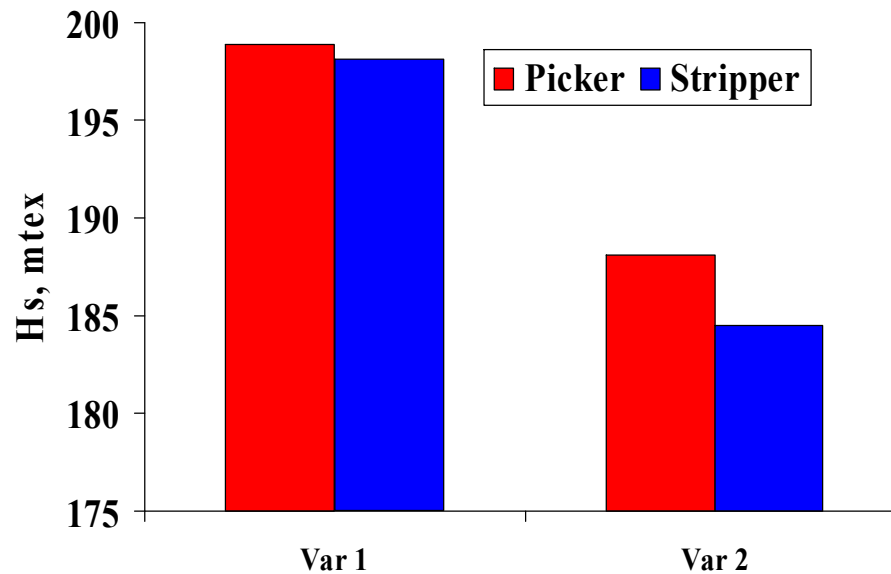
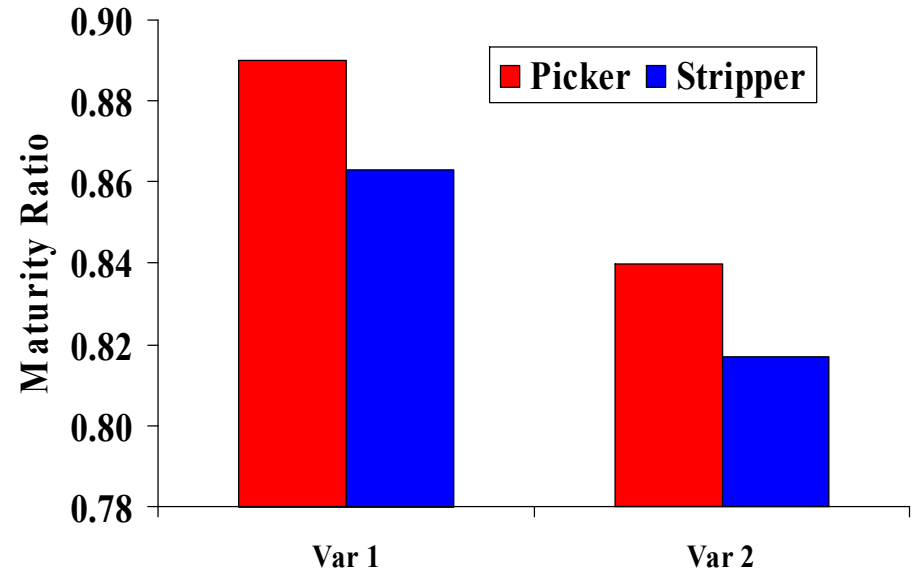
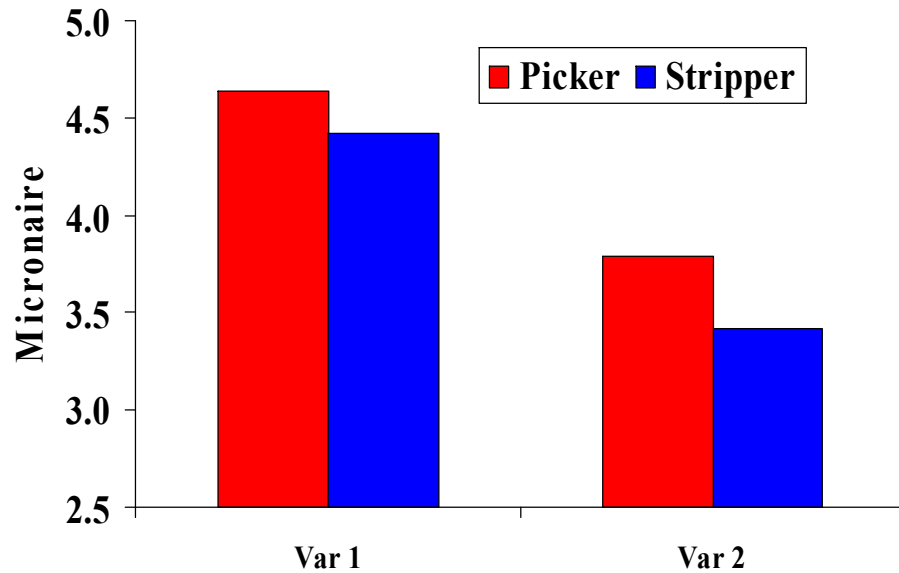


Ring spun yarn carded 40Ne: Hairiness

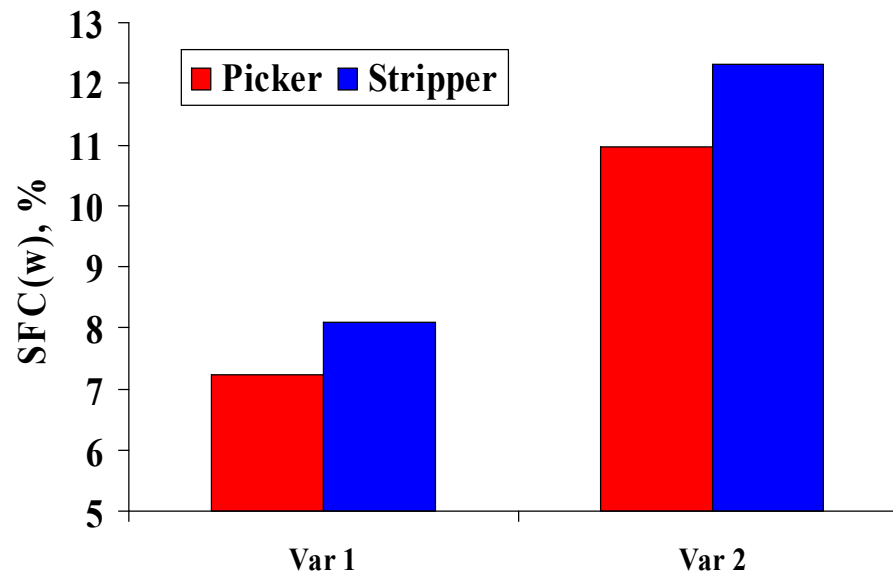
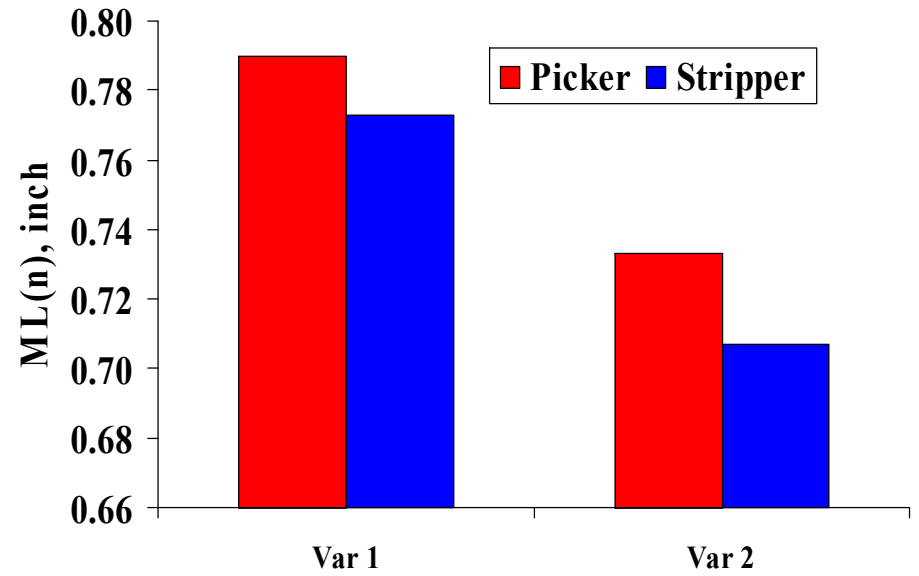
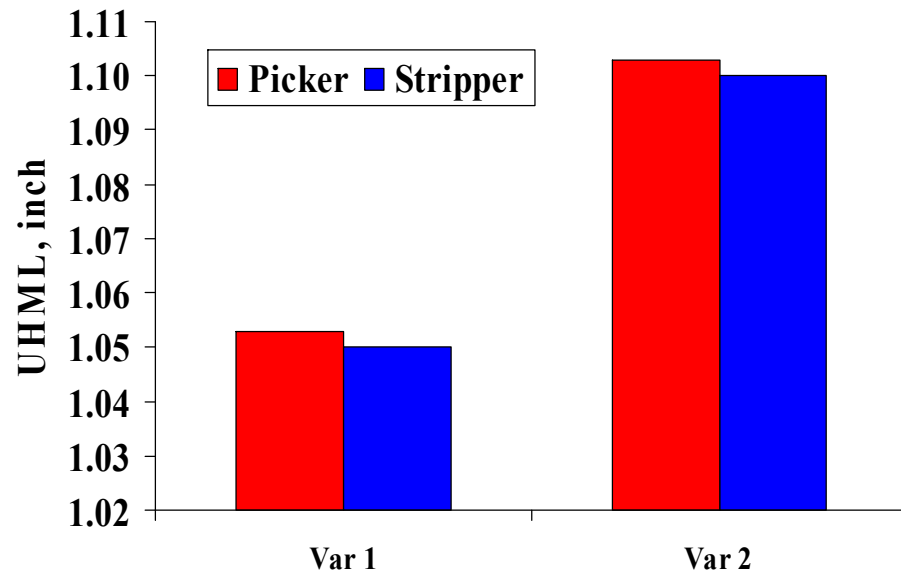


Fiber vs. Yarn: Another example

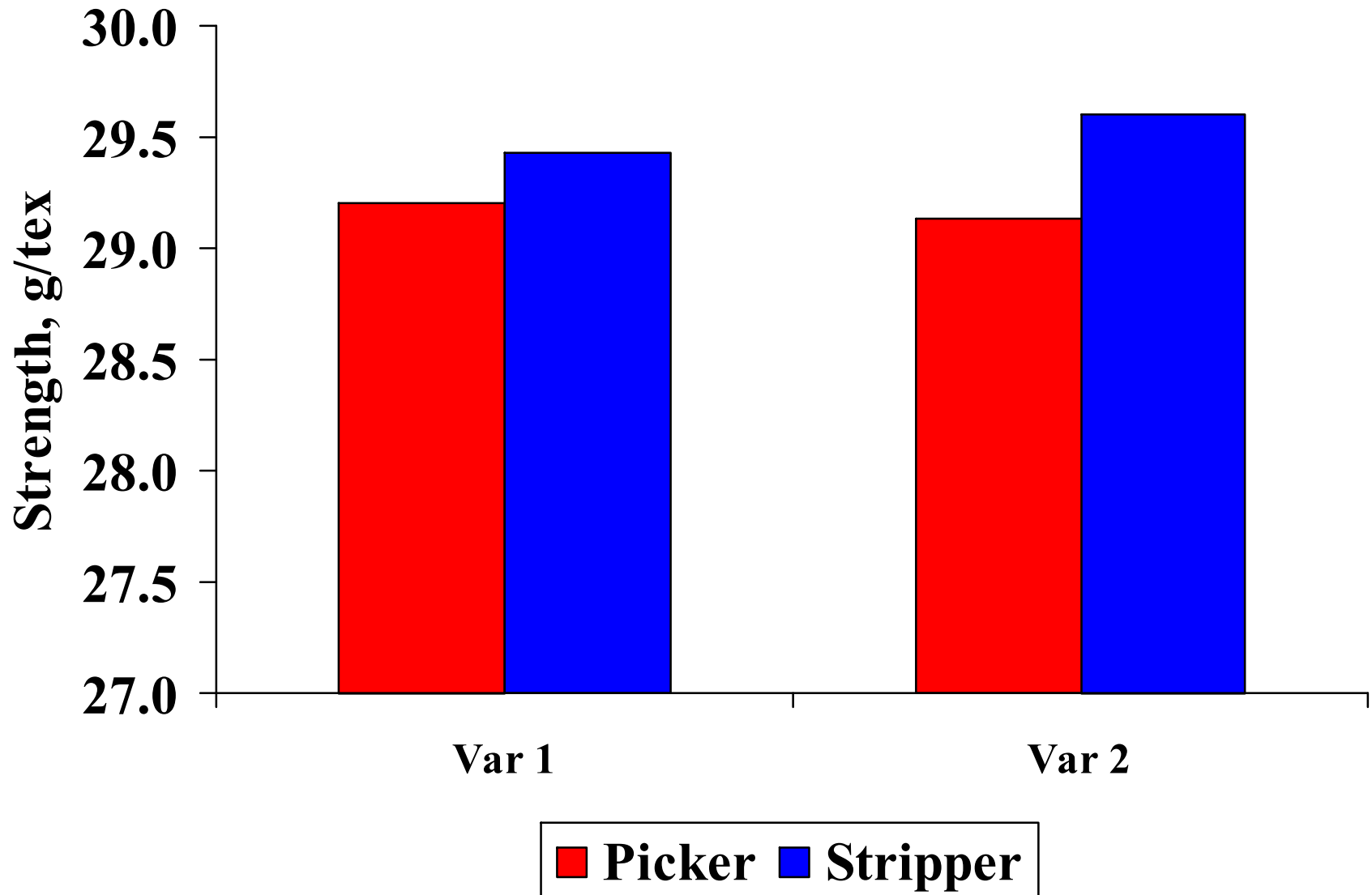
Micronaire, Maturity and Hs



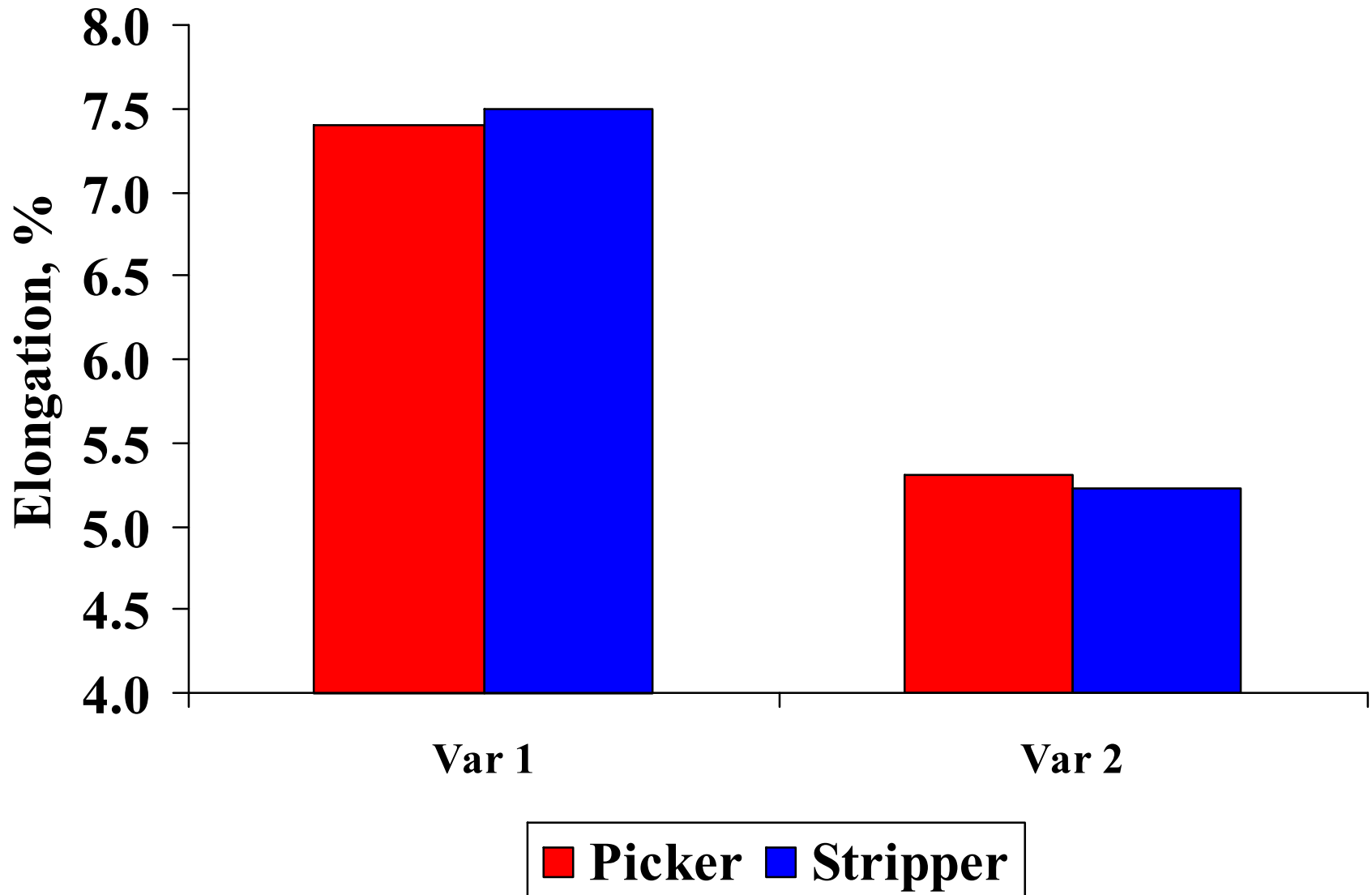
Length parameters



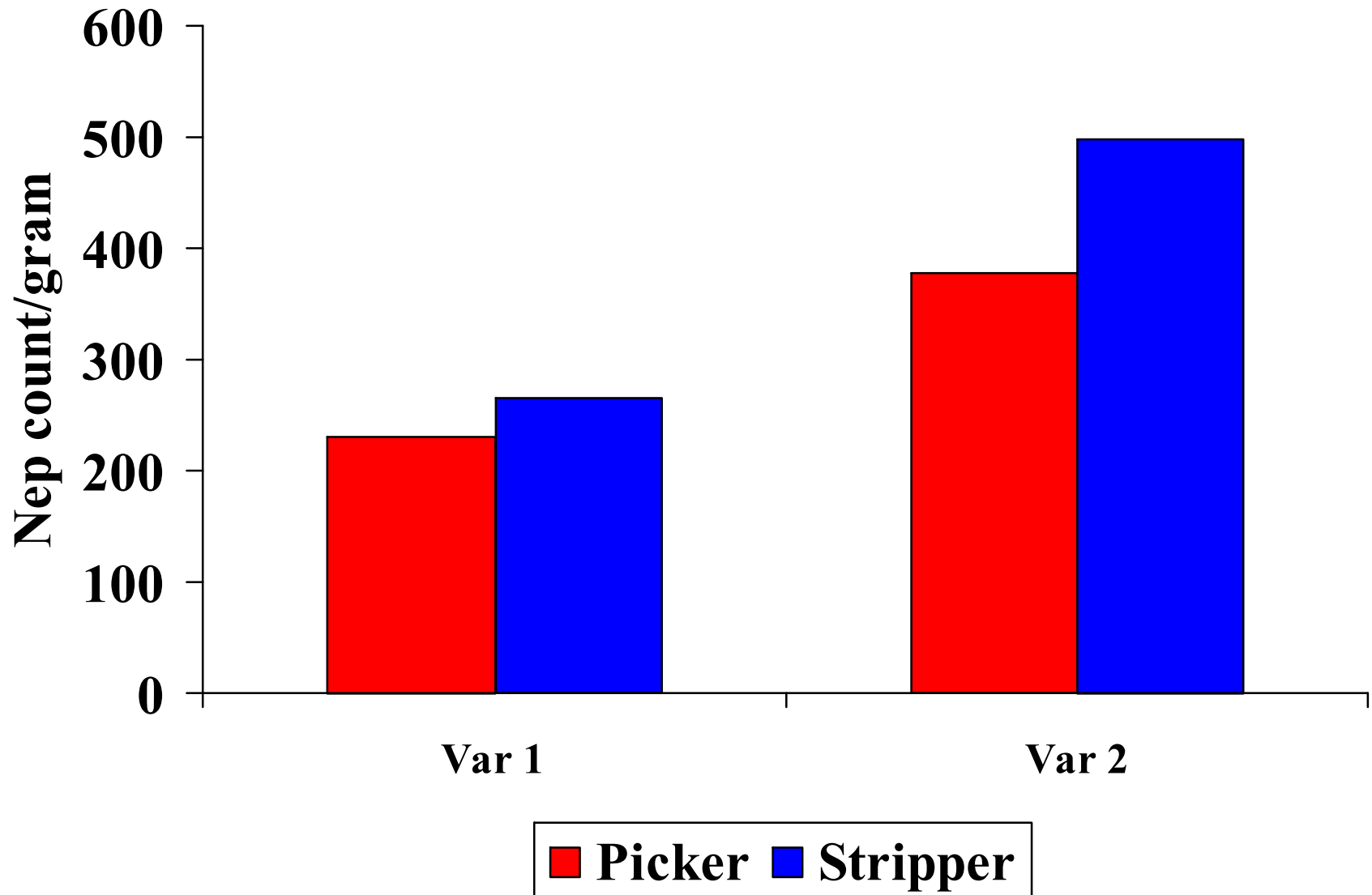
Strength



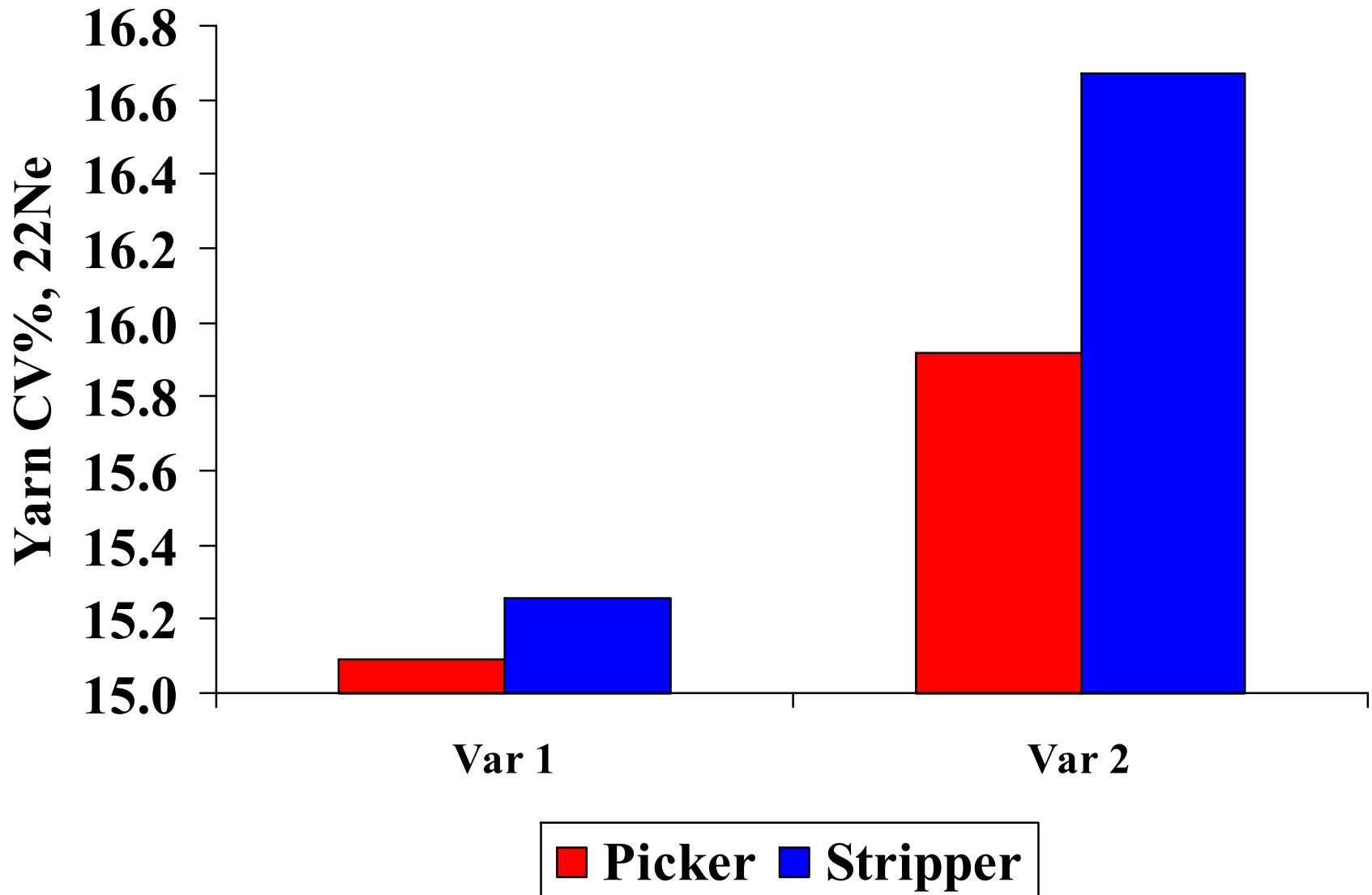
Elongation



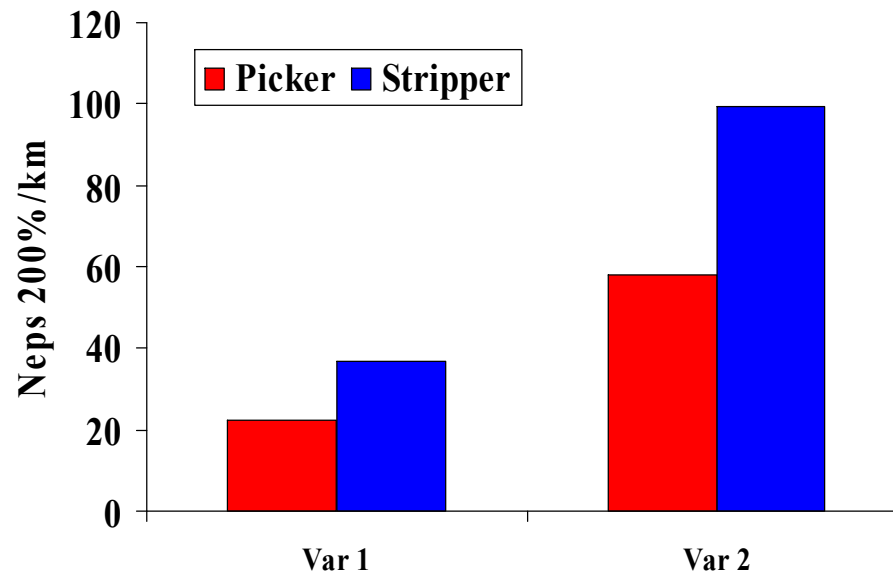
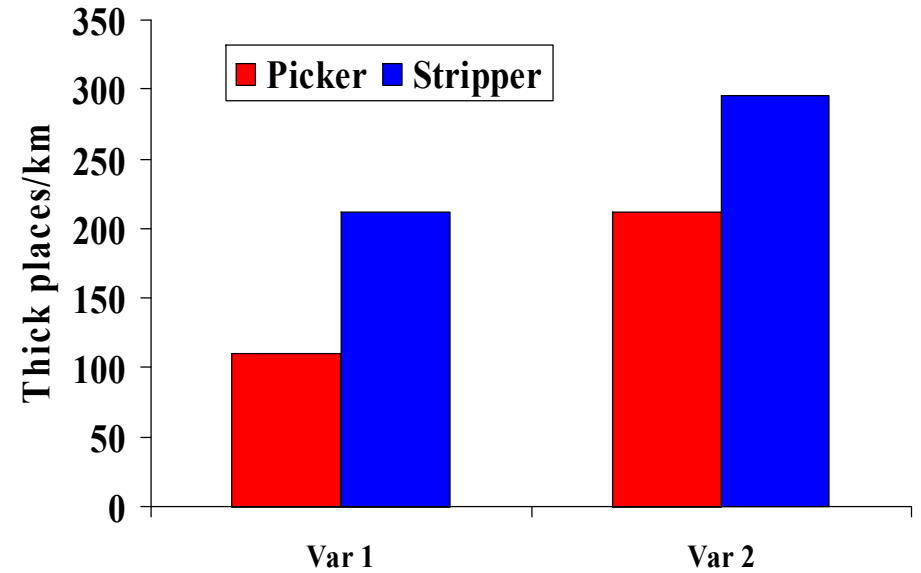
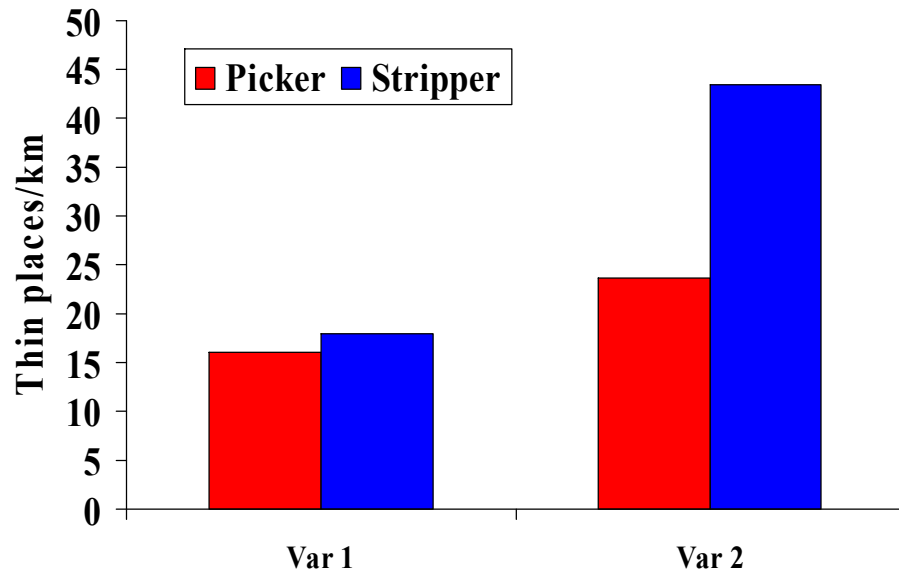
AFIS Neps



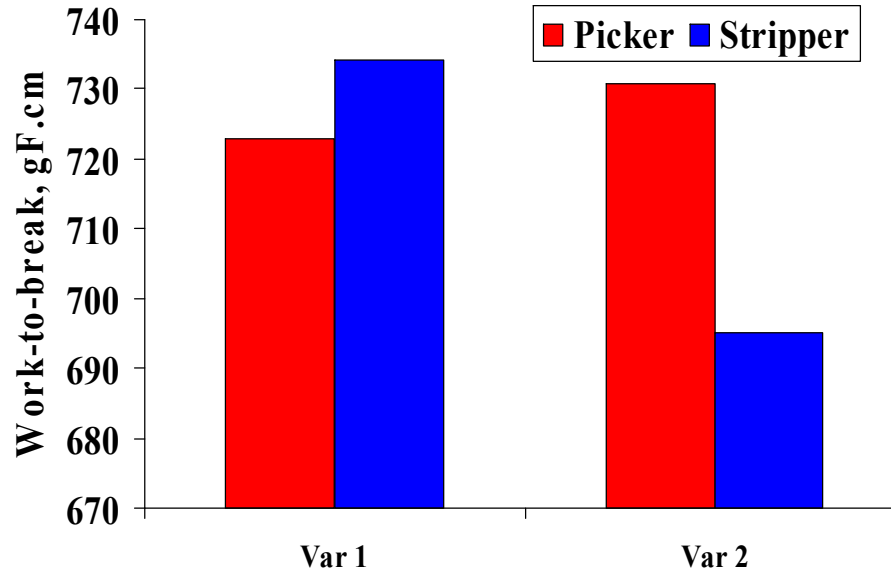
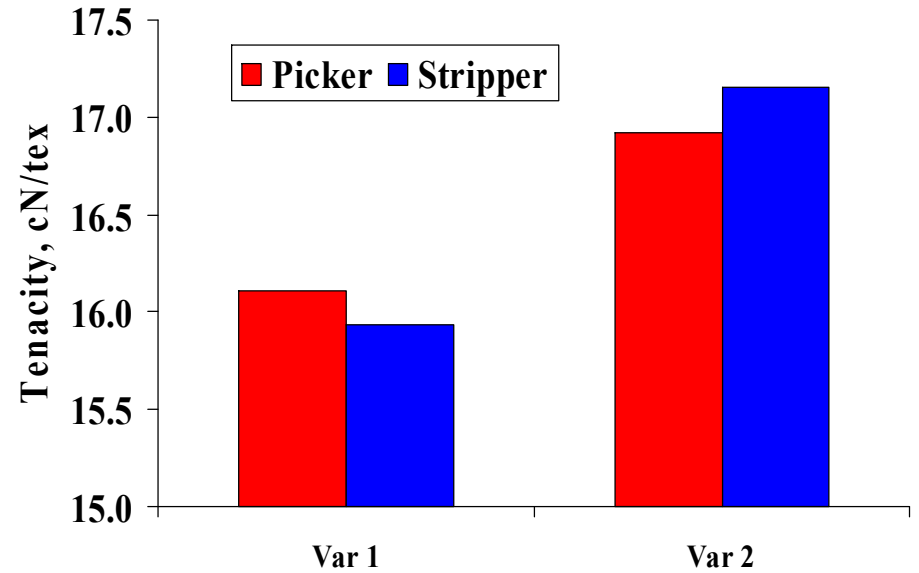
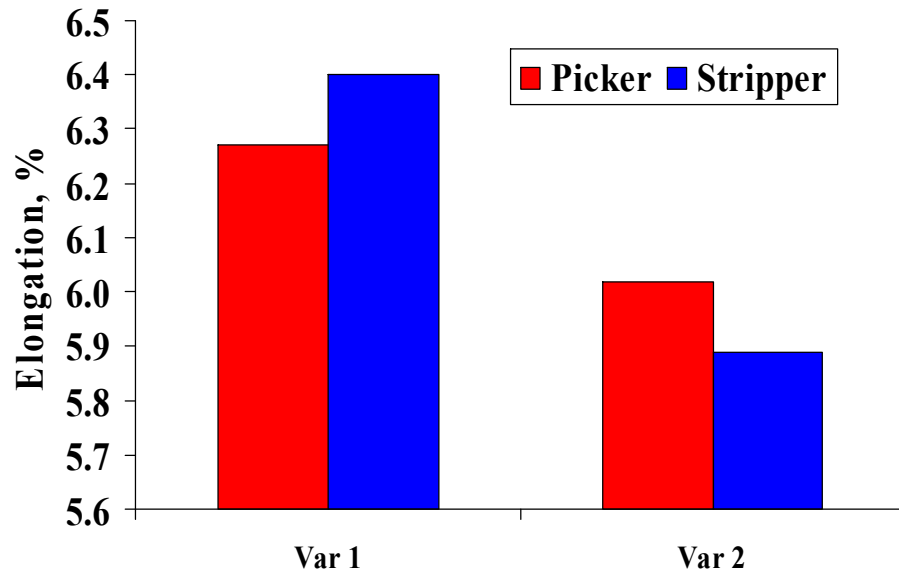
Ring spun yarn carded 22Ne: CV%



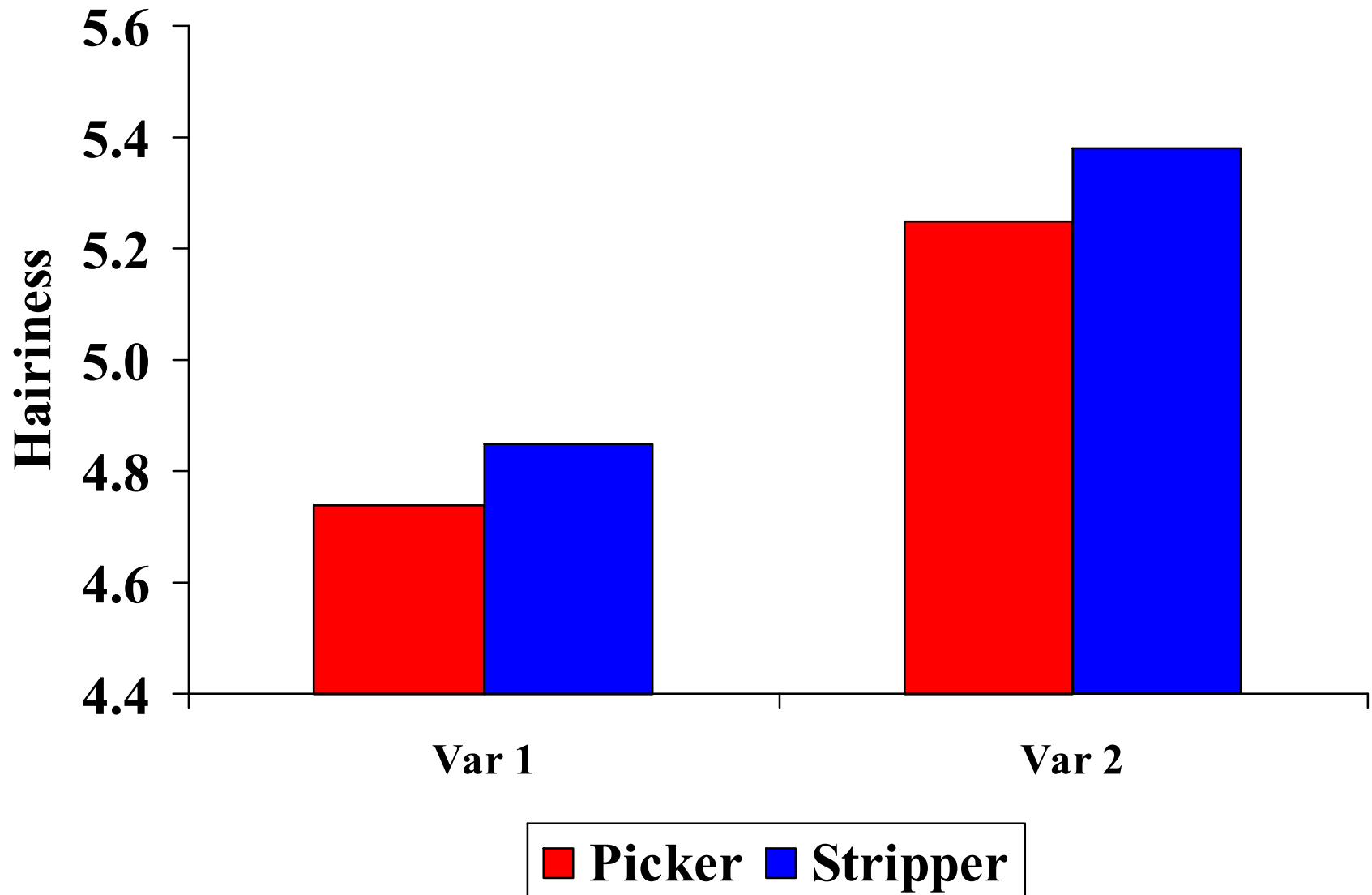
RS yarn 22Ne: Imperfections



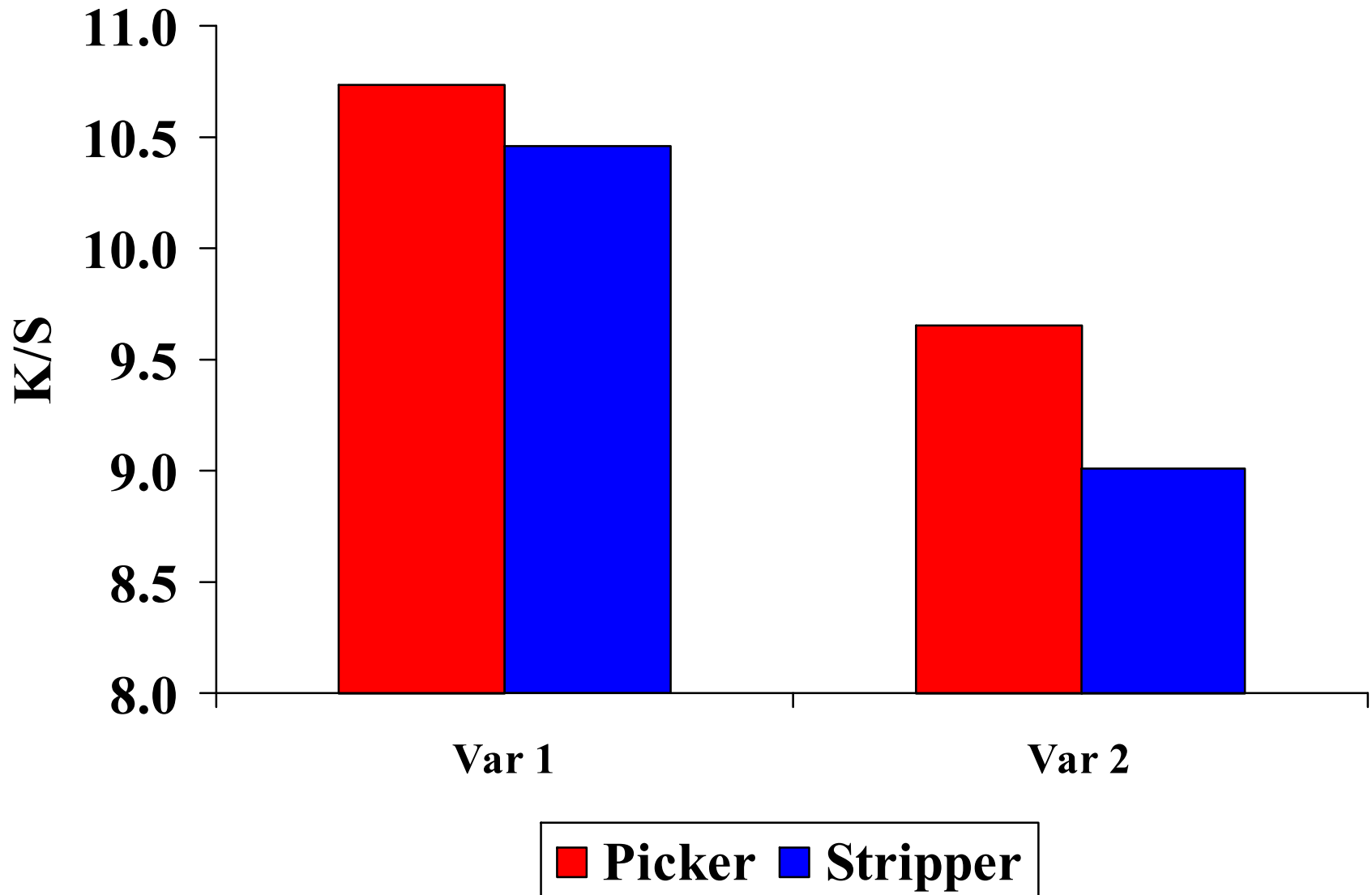
RS yarn 22Ne: Tensile properties



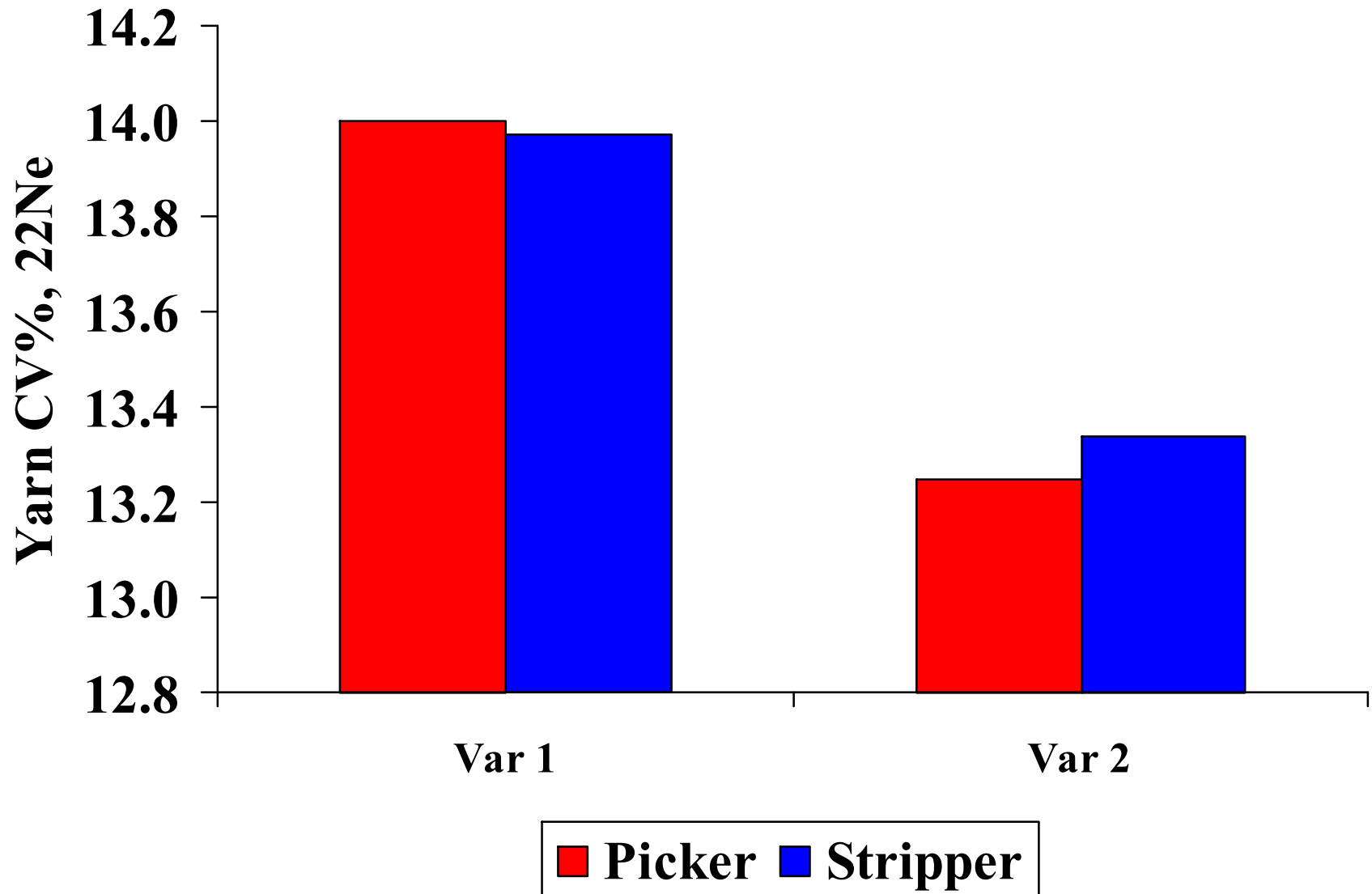
Ring spun yarn carded 22Ne: Hairiness



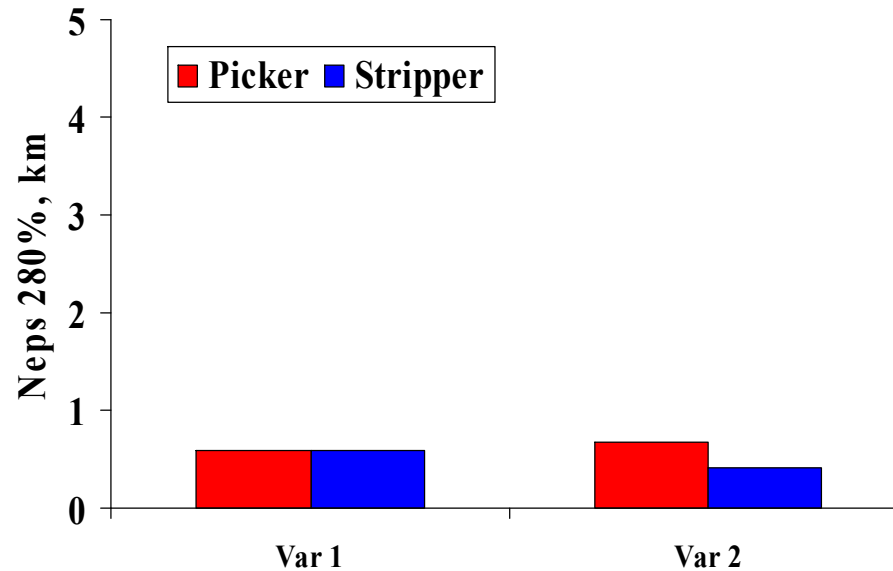
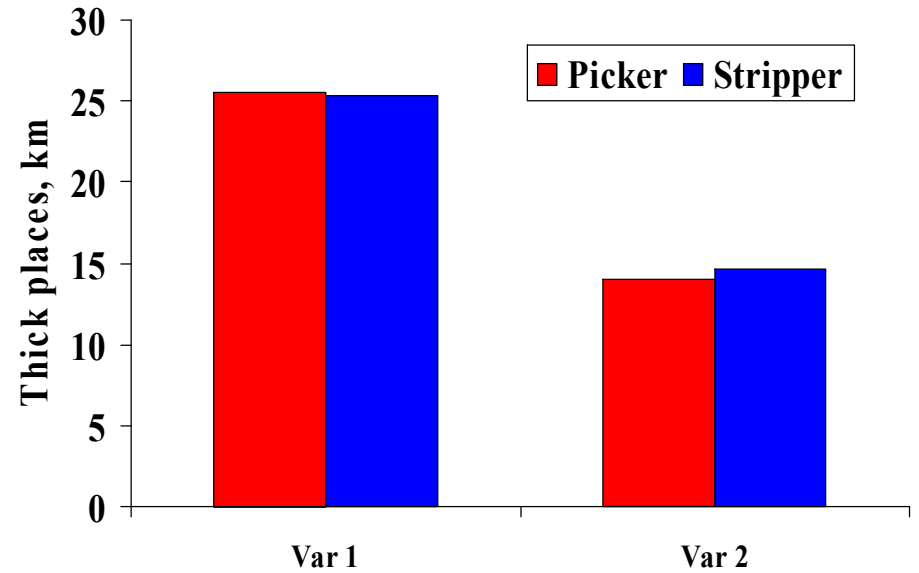
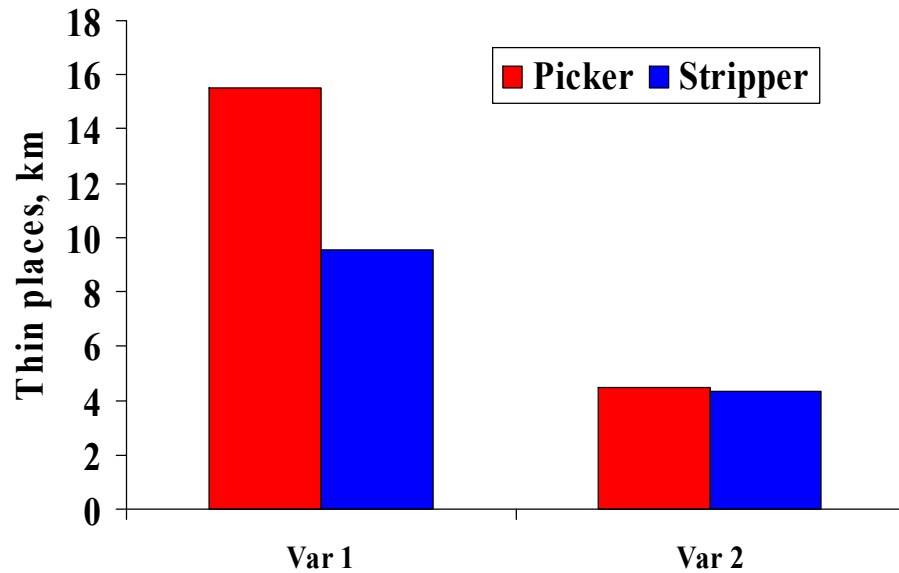
Ring spun yarn carded 22Ne: K/S



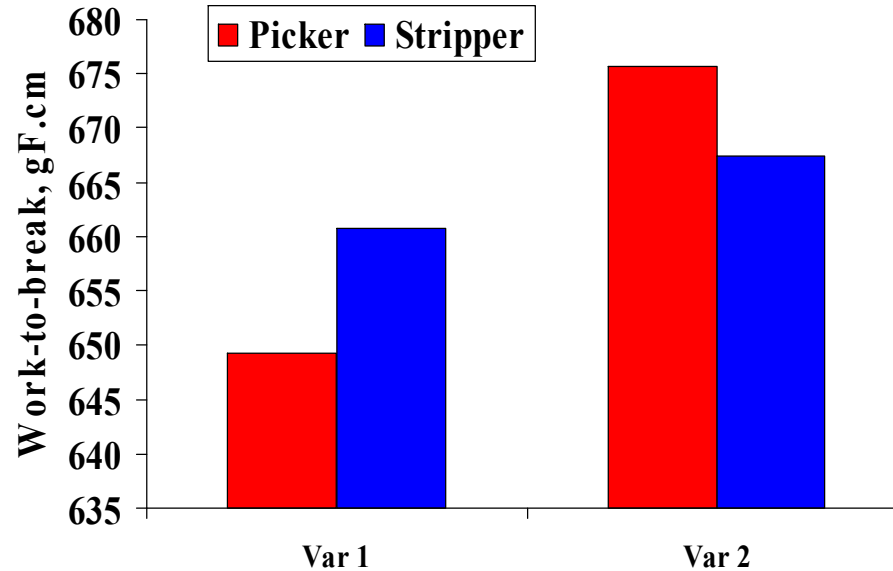
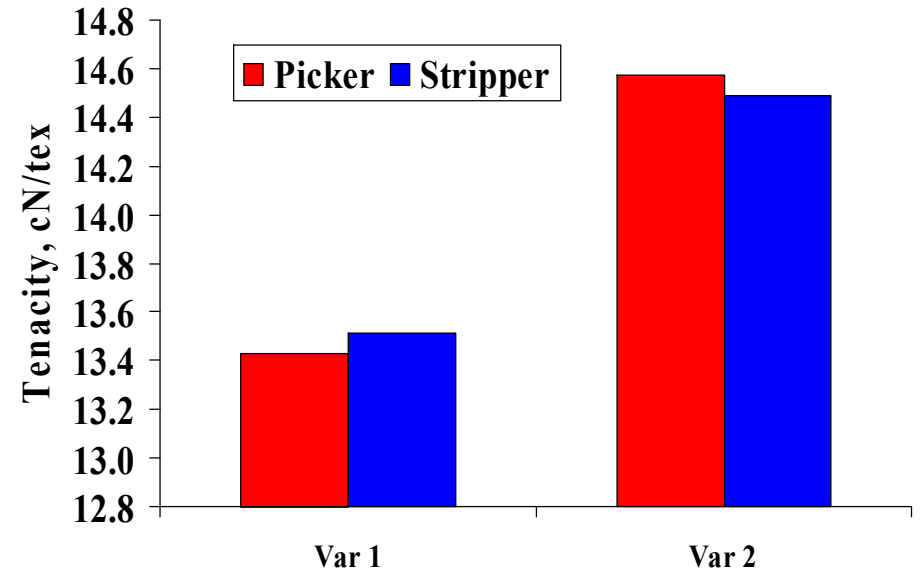
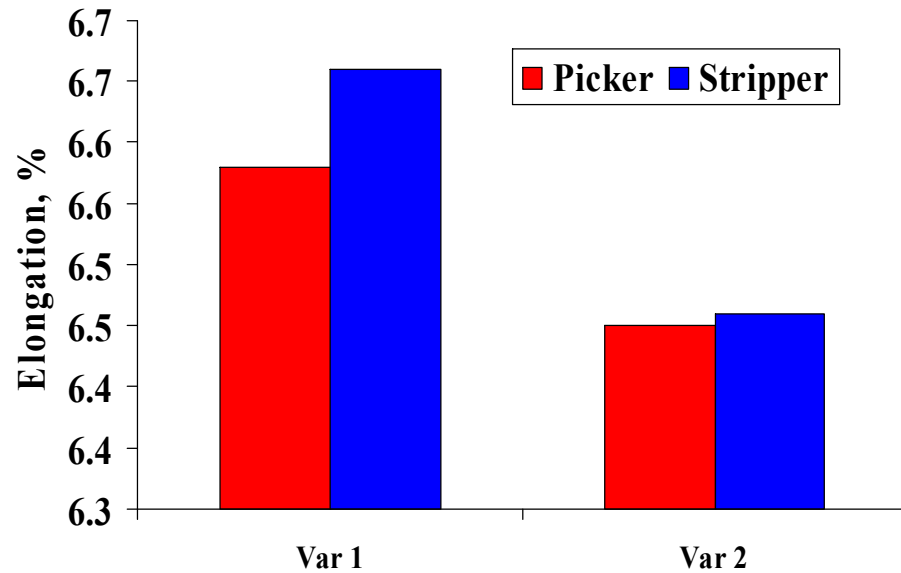
Rotor spun yarn carded 22Ne: CV%



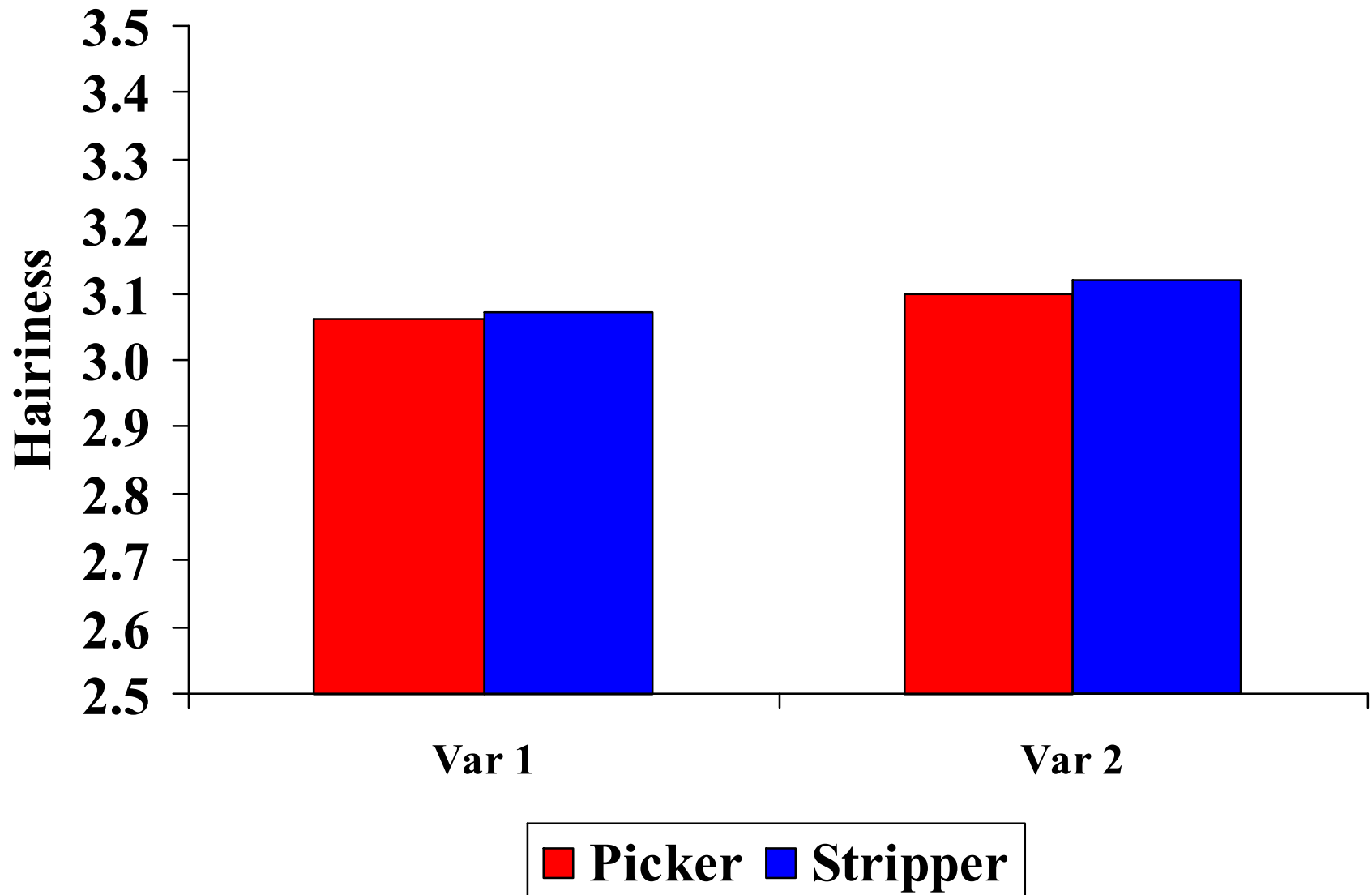
Rotor yarn 22Ne: Imperfections



Rotor yarn 22Ne: Tensile properties



Rotor spun yarn carded 22Ne: Hairiness



Conclusions

- **Length distribution is of the utmost importance for good spinning performances.**
- **Length distribution is related to individual fiber strength, therefore to fineness and maturity.**

Conclusions

- **To get the most of longer cotton varieties adjustments in agricultural practices, harvesting and ginning methods are probably necessary.**