# Quality and care of men's shirts

Harriet H. Prato     Mary Ann Morris



Fig. 1. Staff research associates Jack DeBie (left) and Jim Johnson (right) wearing shirts used in study.



Fig. 2. Outdoor light exposure of shirt fabrics.

**P**rice may be a poor criterion in judging the end-use performance of garments. Price-quality correlations of 30 different shirts which were similar in appearance indicated that the lower-priced shirts surpassed the higher-priced shirts in end-use performance. It was also found that washing the shirts in warm rather than hot water provided comparable soil removal and garment appearance. Shirts similar in appearance but varied in price were studied for (1) the effect of wash temperature on color, appearance, and soil removal, (2) the price-quality relationships with respect to colorfastness, appearance, garment construction, and durability, and (3) consumer perception of colorfastness, appearance, and quality of the garments.

The shirts were of ten different colors, with low-priced, medium-priced, and high-priced shirts in each color. They were purchased from two major catalog outlets and a department store; shirts from the latter were made by nationally-known shirt manufacturers. All shirts were made of 65 percent polyester-35 percent cotton blend fabric and were similar in style. The shirts were worn by UC staff members on the Davis campus for a total of 40 wash-wear cycles (fig. 1). Half of the shirts were washed in hot water (130°F) and the remainder in warm water (105°F). The shirts were then evaluated for color, soil removal, fabric smoothness, collar and seam appearance, and construction failures. In addition, laboratory tests were made on fabric from identical shirts to determine strength, wrinkle recovery, and color change due to laundering, perspiration, crocking (color rub-off), and exposure to indoor and outdoor light (fig. 2).

## Color change

All shirts in the study exhibited good colorfastness in home laundering and wear (table 1)—differences in color change due to wash temperature were small. White shirts were laundered with colored shirts, and there was no transfer of color to the white shirts washed with light- or medium-colored shirts. Some color was transferred to white shirts

showed that deerbrush comprised 1.7 percent of the total understory cover in the forest. Browsing intensity averaged 38 percent of the current year's growth.

Preliminary results on meadow composition show that grass, sedge, clover (*Trifolium* spp.), and rush (*Juncus* spp.) areas intergrade within a given meadow system. Meadow production on 15 sites ranged between 320 and 2700 lb/acre (358 kg/ha.), with an average of 1328 lb/acre (1488 kg/ha.) as determined by paired grazed and ungrazed plots. Cattle utilized the meadows all season long, and utilization ranged between 26 and 87 percent.

## Needs for further research

Results to date illustrate the variability in browse and meadow utilization and indicate the need for better animal distribution on grazed mixed-conifer forests. Although animal distribution is primarily determined by the nature and amount of available forage and water, improvements may be achieved by

### Forage Value Groups for Primary Understory Plants at Blodgett Research Forest

| Desirable | Less desirable | Undesirable |
|---|---|---|
| 1. Deerbrush (*Ceanothus integerrimus*) | 1. Manzanita (*Arctostaphylos patula*) | 1. Chinquapin (*Castanopsis chrysophylla*) |
| 2. Squaw carpet (*Ceanothus prostratus*) | 2. Mt. whitethorn (*Ceanothus cordulatus*) | 2. Tan-oak (*Lithocarpus densiflora*) |
| 3. Sedge (*Carex* sp.) | 3. Snowberry (*Symphoricarpos acutus*) | 3. Azalea (*Rhododendron occidentale*) |
| 4. Bentgrass (*Agrostis* sp.) | 4. Bitter cherry (*Prunus emarginata*) | 4. Mt. misery (*Chamaebatia foliolosa*) |
| 5. 20 additional grasses | | 5. Bracken fern (*Pteridium aquilinum*) |

removing slash to open up areas otherwise inaccessible. Salting may also be used to influence animal distribution. Cross fencing to control animal access to meadow systems may be appropriate in some cases, although cost limits its applicability.

The mixed-conifer forest is a complex ecosystem of potentially many uses, and the key to its full development and proper management is research. Answers are needed to such questions as: What are the effects of livestock on tree reproduction? What is the value of the land for timber production, for-

age production, and simultaneous production of both? How does grazing affect water quality and wet-meadow vegetation? What are the effects of timber production and grazing on distribution of different kinds of understory forage? Our study will continue to address these questions.

*Barbara H. Kosco is Research Assistant, and James W. Bartolome is Lecturer and Associate Specialist, Department of Forestry and Conservation, Berkeley. Assistance from Bob Heald, personnel at Blodgett Forest, and Dan Kosco, and financial support under AES-2500, are gratefully acknowledged.*

# Men's shirts . . .

washed with dark-colored shirts, but the color change was small and disappeared after a few wash cycles. In some cases fabrics of varying colors (including white) may be washed together without deletrious effects on color. This would allow consumers to wash fewer loads, and thus conserve energy and water.

## Appearance and soil removal

Laundering in hot water as compared with warm water made some differences in soil removal and appearance (tables 2, 3). Garments washed in hot water had slightly better removal of soil and wrinkles resulting from wear, whereas garments washed in warm water retained better collar appearance. The differences were gener-

ally small and no distinct advantage was found for either wash temperature. These garments were subjected to 40 wash-wear cycles, a long enough period for any possible changes to occur.

## Price-quality correlations

Comparisons of shirt prices with results of the wear study and laboratory evaluations indicated that the lower-priced shirts surpassed the higher-priced shirts in colorfastness, appearance, and fabric strength. Construction quality varied directly with price, but was satisfactory in all cases. Price and brand name would have been the only criteria for the consumer to use in selection, as the shirts were all similar in appearance. These re-

sults clearly demonstrate that informative labeling or use of a grading system would allow the consumer to choose more intelligently.

Responses from a questionnaire given the wearers at the end of the study were used to evaluate the consumer's perception of performance and quality. The wearer's ratings of the over-all appearance of his shirts showed a significant negative correlation with price, again supporting the conclusion that the lower-priced shirts were of better over-all quality.

*Mary Ann Morris is Professor, and Harriet H. Prato is Staff Research Associate, Textiles and Clothing Division, Davis.*

### TABLE 1. Color Difference (ANLAB Units)* after Wear and Laundering at 130°F and 105°F

| Number of wearings and launderings | Color difference 130°F | Color difference 105°F |
|---|---|---|
| 15 | 1.7 | 1.6 |
| 25 | 1.9 | 1.6 |
| 40 | 2.1 | 1.8 |

*An ANLAB unit is calculated from instrument readings on original and exposed fabrics (shirts). A value of 1.5 indicates a color change that is just perceptible.

### TABLE 2. Percent Soil Removal from Collars after Laundering at 130°F and 105°F

| Number of wearings and launderings | Percent Soil Removal 130°F | Percent Soil Removal 105°F |
|---|---|---|
| 1 | 84.7 | 74.3 |
| 3 | 66.4 | 63.6 |
| 6 | 61.0 | 51.2 |
| 12 | 59.6 | 52.0 |
| 18 | 60.7 | 49.8 |
| 40 | 42.4 | 44.6 |

### TABLE 3. Appearance Rating after Laundering at 130°F and 105°F

| Evaluation | Number of wearings and launderings | Rating* 130°F | Rating* 105°F |
|---|---|---|---|
| Fabric smoothness | 1 | 3.9 | 4.3 |
| | 10 | 3.6 | 3.5 |
| | 40 | 3.8 | 3.4 |
| Collar appearance | 1 | 1.9 | 2.5 |
| | 10 | 1.2 | 1.6 |
| | 40 | 0.8 | 1.2 |

*5 = excellent; 1 = poor.