AGRICULTURE

King Cotton Won't Abdicate

Plenty of Troubles Have Beset Southland's Monarch But Researchers Aid by Discovering New Crop Uses

By DR. FRANK THONE

KING COTTON is dead—so they say.

Economists of the more pessimistic persuasion, politicians who hope to make their own fortunes at his funeral, even some of the mournfuller kind of agricultural experts, have been holding his wake for several years.

The only thing wrong with these solemn festivities is that they have forgotten to invite the corpse.

For the white-headed monarch isn't dead yet, by a long shot. There's a scrap in the old boy yet.

True, he's had tough going, of late. He's had a remarkable array of maladies —weevil, bollworm, root-rot, and a lot more—for which the doctors have at best found only partial cures. He has seen formidable efforts at secession on the part of some of his overseas dominions, with ingrate offspring of his own setting up competing kingdoms under alien flags. He has suffered losses at home, too: men out of jobs don't need cotton overalls; women wearing less than a fourth of the clothes their grandmothers wore, and insisting that their now more visible legs shall be glossy in rayon or silk. And so on—a whole series of troubles.

But two or three troubles, or even ten or twenty, do not make a funeral. Mushroom dynasties may collapse as quickly as they arise; but King Cotton's realm, like Rome, was not built in a day, and if it falls like Rome it will most likely be as long as Rome was in falling.

Fighting

Not that King Cotton's loyal retainers are letting their optimism make do-nothing standpatters of them. They realize that they are in a fight, and that as in any fight he who merely stands still with the idea of letting the battle win itself is just about as badly off as he who incontinently runs away. They are all up and doing, and in the very front rank of effectives stand the corps of scientists.

These scientists in King Cotton's army, in the U. S. Department of Agriculture, in State Experiment Stations all through the South, in universities and commercial laboratories and textile mills and chemical plants, fight on a hundred fronts with a hundred weapons. Some of them seek to make cotton better and stronger than it ever was before, and thereby improve its competitive position with regard to other fibers. Others seek new uses for cotton "as is," because they realize that improved cottons must have time in which to be developed and distributed among the millions of growers. Still other scientific supporters of Dixie's ancient King are trying to find ways of cheapening mass production, especially by the use of machine methods to replace hand labor which is always expensive even at starvation wages.

If even a few of these efforts succeed, the millions of King Cotton's dependents will have cause for rejoicing, and all of us will receive at least indirect benefits in returning prosperity and better cotton goods.

The newest move in the campaign to give American cotton new technical and economic advantages is the production of a unique and promising hybrid, by scientists of the U. S. Department of Agriculture. Not only cotton technicians but leading cotton manufacturers are interested—even excited. One such manufacturer declared that for his business "It is the dawn of a new era!"

The story of the new hybrid cotton has more than a little romance in it—the romance of a Cinderella among plants. Of a Cinderella who really had little to recommend her, yet who concealed, among a lot of faults, one high redemptive quality.

Hopi cotton, raised by the Hopi Indians on their reservation and by nobody else, is pretty poor stuff. It yields only a few pounds per acre, it drops its bolls before they mature, it is pretty generally worthless. Not even the most shiftless poor white or the most "triflin' " Negro, in the Cotton Belt, would plant Hopi.

Its one great virtue, neglected and overlooked for many years, is the extraordinary fineness of its short fibers, or "staple." Fineness of fiber seems to be closely correlated with strength. The strongest cotton hitherto in common use has been the Sea Island variety, which could be raised only in a very limited area in the Southeast.

Because the staple of Sea Island cotton was longer than that of any other commercial variety, it used to be thought that its strength was due to the great fiber length. But Dr. R. S. Webb of the

FATE IN DOUBT

Some of King Cotton's humbler subjects. What is to become of them if cotton-harvesting becomes a machine job?

NEW POSSIBILITIES

The Rust cotton-picking machine is towed through a cottonfield by the cotton-mule's successor, a tractor. This rear view shows the row of spindles.

U. S. Department of Agriculture disproved this notion by cutting Sea Island fibers to the length of ordinary upland cotton fibers and then spinning them. The Sea Island thread was still much the stronger.

That left fineness of fiber as the alternative explanation of strength. Search was begun for a fine-fibered short-staple cotton, to be crossed to advantage with the more abundant-yielding upland cottons.

Dr. T. H. Kearney, also of the Department of Agriculture, thought of Hopi cotton, fine-fibered but otherwise an agronomic outcast. From a small sample available a thread was spun. Tests demonstrated conclusively that great strength did go with its great fineness. It was almost impossible to break it in the Department's fiber-strength testing machine.

Crossed with Acala

For this one virtue, then, Hopi was mated with Acala, a superior upland cotton, widely cultivated all the way from southern California to the Carolinas. First crosses, now in the hands of Department plant breeders, display a high degree of the expected fine-fibered strength and high spinning quality. Crosses with other varieties are also being made, and their fibers tested.

It will be several years at best, Dr. Webb warns, before seed of the new Hopi hybrids can be available for general planting. There are very few plants in existence this year, and they will all be needed for experimental purposes, further breeding, and the elimination of the less desirable lines of descendants. But in the end, a general improvement in American upland cottons is practically assured, with resulting advantage in the battle against increasing foreign cotton competition for favorable position in the world market.

Seek Outlets

In the meantime, of course, we still have the standard kinds of cotton with us, and another group of Department of Agriculture workers, collaborating with State research men and industrialists, are searching every possible nook and corner for new outlets for cotton. Some of the possibilities are brand-new things, some are improvements of old ways, others are efforts to adapt cotton to uses now monopolized by other materials.

Certain new uses in the past have not had to be hunted for. They were "naturals"—large-scale industrial demands that actually hunted for the cotton, rather than the other way around. Automobile tires, for example, have made a market for millions of bales, that did not exist at all a little over a generation ago. And soon cotton in the tires was joined by cotton on the seats, as leather proved both too expensive and not particularly satisfactory. And now cotton gets a third chance at the auto industry, in dissolved form, as a base for the "plastics" that lacquer the body and coat the leather-like fabrics of the upholstery.

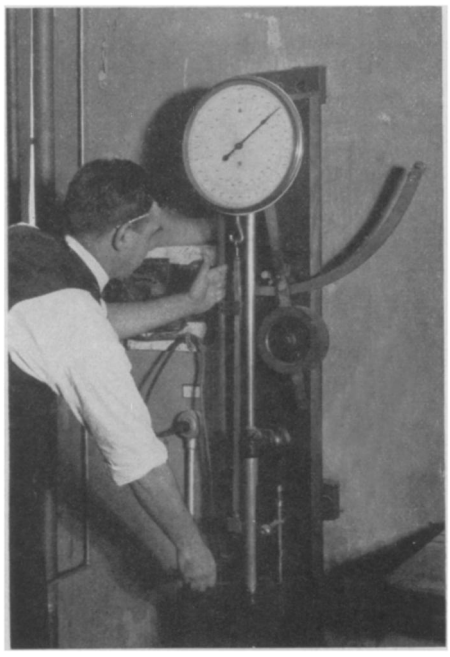
That new plastics industry, which makes everything from sheer hose and ivory-like toilet articles for milady to knobs and gearwheels for factories, is using up a lot of cotton, and particularly of "linters," the once-useless downy fluff that clings to the cotton seed after the long fibers have been ginned off. Of course, this "chemical cotton" has to face the competition of chemical wood pulp, for any good grade of cellulose is grist for the plastic-maker's mill. But cotton gets its share, at least, of this business.

Airplane Wings

As the automobile made new business for cotton, so does the motorcar's winged brother, the airplane. Cotton fabric goes on airplane wings and bodies, which are coated with a "dope" that may be made of dissolved cotton. Cotton parachutes are used now, where once silk was thought to be the only suitable parachute material. Cotton fabric forms the enormous "cells" in Zeppelins, that hold the lifting gas. Finally, when an airplane lands in future airports, it may literally land on a field of cotton. Not the kind of cotton-field that Tin Pan Alley minstrels always mix in with Mammy and Alabammy when they slam the old pianny, but a field with runways stabilized and strengthened with cotton fabric under the tarmac. Cotton roads built in this way are already under extensive test in the South.

The annual campaign of cotton has always been carried on largely by what might be termed cotton infantry—a tremendous army of hand laborers in the fields, "chopping cotton" through the summer and picking it in the fall. It is back-breaking work, not too well paid at best, yet it is the sole means of support of millions of our people, both white and colored. Machinery, which revolutionized the cotton industry from the harvested bolls onward, had not yet touched it in the field, as machinery touched and revolutionized the agriculture of the great grain belt.

But now it begins to look as though cottonfield artillery were going to move into position at last. After scores of others had failed in efforts to invent a



MEASURING STRENGTH

A cotton-testing machine at the U. S. Department of Agriculture, Washington, D. C. A little bundle of fibers to be tested is clamped in the holder alongside the operator's left hand, and pulled until it breaks. Its "breaking strength" thus determined is read off on the dial.

practical cotton-picking machine, the Rust brothers, of Memphis, have developed one that looks as though it will work. Instead of the complicated and expensive arrangements of hooks and barbs that made other machines failures, they use smooth wire spindles, kept moist with water, that twist the fluffy cotton right out of the pod. Two men, with a tractor and one of the Rust machines, are said to be able to harvest as much cotton in a day as a pair of skilled pickers formerly could in a whole season.

It has not all been smooth sailing. Earlier models of the picker got the cotton, to be sure, but they also took too many leaves. Leaves in baled cotton either dry out and crumble as "leaf trash" or undergo wet decay and make spoiled spots in the cotton in that way. The inventors have been working hard to "get the bugs out" of their machine.

A different method for eliminating hand-picking of cotton is advocated by Dr. Frank K. Cameron of the University of North Carolina. He says that the cotton country of his state is too hilly for the use of picking machines, and believes that the only salvation of the oldest cotton states lies in their going "whole hog" in the matter of producing "chemical cotton." His scheme is to cut the whole plant, stalk, leaves, bolls and all, with a mowing machine, dry and bale it like hay, and grind the whole business to pulp for the plastics manufacturers, after extracting the oil.

Of course, if the vast army of cotton-field hands lose their jobs as a result of the Rust system, the Cameron system, or any other method of mass handling of the crop, there is going to be a lot of social adjusting necessary. The Rust brothers realize this, and are trying to figure out a way of making their machine support the population instead of pressing the poorest into still worse poverty. Their machine may make them barons in the realm of King Cotton, but they desire above everything else to avoid the stigma of being robber barons. Their social invention will be watched with even keener interest than men turn on their mechanical invention.

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PHYSIOLOGY

Bad Weight Distribution Blamed For Foot Troubles

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THE MAIN reasons for foot troubles are these: First, civilization; second, over-use; third, improper weight distribution.

The common types of arch and foot troubles are essentially town and city ailments. They do not prevail in rural and primitive conditions. Hard floors and pavements, jobs which require long hours of standing, economic pressure which keeps the individual going when signs of foot trouble have appeared—these are serious factors when a person has feet that are susceptible to disorder, though they do not affect people with more perfectly designed feet.

As for over-use, the capabilities of everybody's feet are not the same. This was recognized in selection of recruits in the War, for during their physical examination men with imperfect feet were assigned to a group designated Selective Service. They were then allotted to branches of service which did not include long hours of drill and marching. No such plan is followed in civil life. Many young people get started in work or trades which their feet are not fitted for, and they find this out too late. They must either continue with a progressing foot disability, that soon brings their economic usefulness to an end, or else start in some new line—sacrificing all the advantages of their previous experience.

Improper weight distribution, the third factor, is the most fundamental cause of functional foot troubles, and the underlying cause of all of them.

Body weight is supported, of course, by the bones of the feet. In back, there is one big heel bone; but in front the weight has to be divided between five relatively slender bones, called the metatarsals. They extend from the middle of the instep to the base of each toe.

If body weight is properly shared by each of these bones the foot functions normally. If, however, the stresses of body weight are concentrated on a single one its joints are liable to become irritated and inflamed from the strain.

To learn how weight is normally distributed on these metatarsal bones, special instruments were devised. We found that in standing, each metatarsal bone bears about the same amount of weight except the first one, located behind the big toe. It is larger and stronger and carries a double share, twice as much as each of the others.

In walking or running, the entire weight of the body is thrown forward and swings toward the front ends of the first and second metatarsal bones which act together as the fulcrum of the foot's leverage action. These are normal conditions.

What happens when we have foot troubles? In every such case we found that these conditions of weight distribution were changed, and that the reason was located in the large first metatarsal bone. Either its ligaments were lax, or the bone itself was too short.

When the ligaments to the big first metatarsal bone are lax, it is unable to have a firm supporting contact with the ground, so that its double load falls on the weaker metatarsal next to it and behind the second toe, and the workings