

# Coming Soon: The Perfect Alfalfa

*Arizona-grown alfalfa adapting to desert life*

BY MAGGY ZANGER

**D**efine the perfect alfalfa plant for Arizona. It would have a high yield per plant and survive for five or more years. More importantly in this arid region, the perfect alfalfa would continue growing during cooler months and lie dor-

mant during the hot summer, greatly increasing the efficiency of water use.

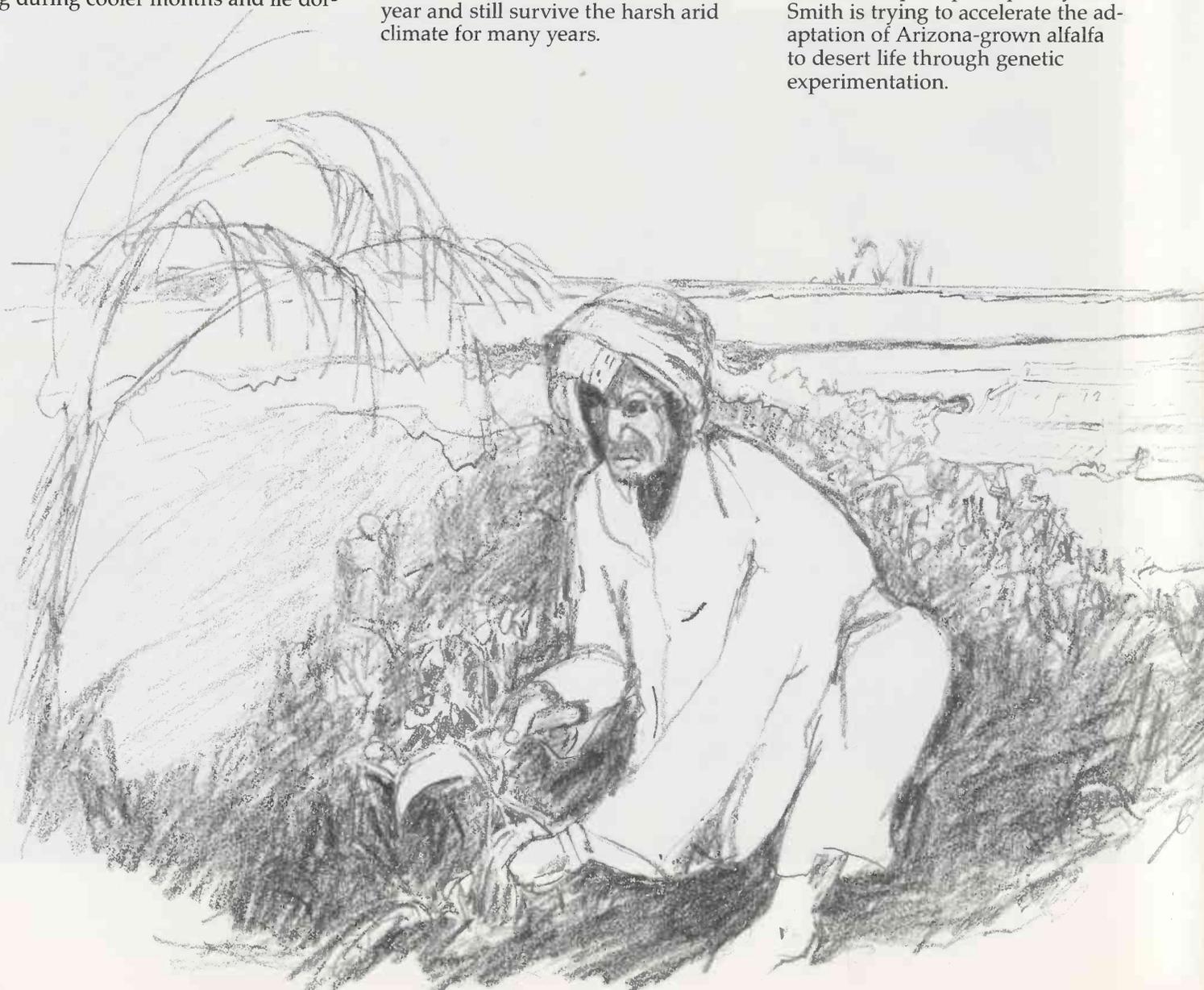
This is the alfalfa University of Arizona research professor Steven E. Smith is striving for, breeding various varieties in search of the right genetic combination.

"A major goal of our research program is to develop alfalfa that has the ability to be more productive during the cooler times of the year," Smith says. He is looking for a plant that can be harvested nine to 13 times a year and still survive the harsh arid climate for many years.

Alfalfa is one of the most widely adapted forage crops in the world, growing near the Arctic Circle, Indian semitropics and Middle Eastern deserts. Saudi Arabia, in particular, has a climate very similar to Arizona's, Smith says. Farmers have cultivated this perennial crop for thousands of years in that region, and it has become uniquely adapted to the climate and needs of the grower.

In contrast, alfalfa has been an Arizona crop for perhaps 85 years. Smith is trying to accelerate the adaptation of Arizona-grown alfalfa to desert life through genetic experimentation.

Illustration by Ann Helmericks



Alfalfa is the third largest crop in Arizona, with more than 170,000 acres planted. Since Maricopa County is perhaps the sixth or seventh largest dairy producing county in the country, alfalfa is in high demand. As much as 70 percent of Arizona dairy cow diet consists of alfalfa because it is high in protein.

Smith began researching Middle Eastern varieties of alfalfa five years ago. He found they were unique in their ability to regrow rapidly after harvest and were able to remain productive during the late fall, winter and early spring. But, they don't survive for many years.

Arizona-grown alfalfa, on the other hand, has been bred for persistence—survivability in a harsh climate. Plants that survive for many years do so because they are "conservative" growers. Compared to Middle Eastern types, they grow slowly and steadily for a long time, but un-

fortunately, the overall yield of persistent plants is low. Generally, the higher the persistence, the lower the yield. And the higher the yield, the lower the persistence.

Smith would like to create an alfalfa variety genetically combining the best features of both Arizona and Middle Eastern varieties: a higher yielding, rapidly growing plant that persists and remains productive during the winter months. A plant that grows slowly during the hot summer and remains productive during the cooler winter will need less irrigation and be more economical to cultivate. Alfalfa varieties from Saudi Arabia, Sudan and Egypt can produce up to 40 percent more forage in the winter and spring than varieties currently in use in Arizona.

Middle Eastern alfalfa varieties also regrow more rapidly immediately following harvest, as much as 4 inches a day compared to Arizona alfalfa, which grows perhaps 2 inches a day. The Middle Eastern alfalfa grows so quickly, Smith says, because of the way the plants have been harvested over the centuries.

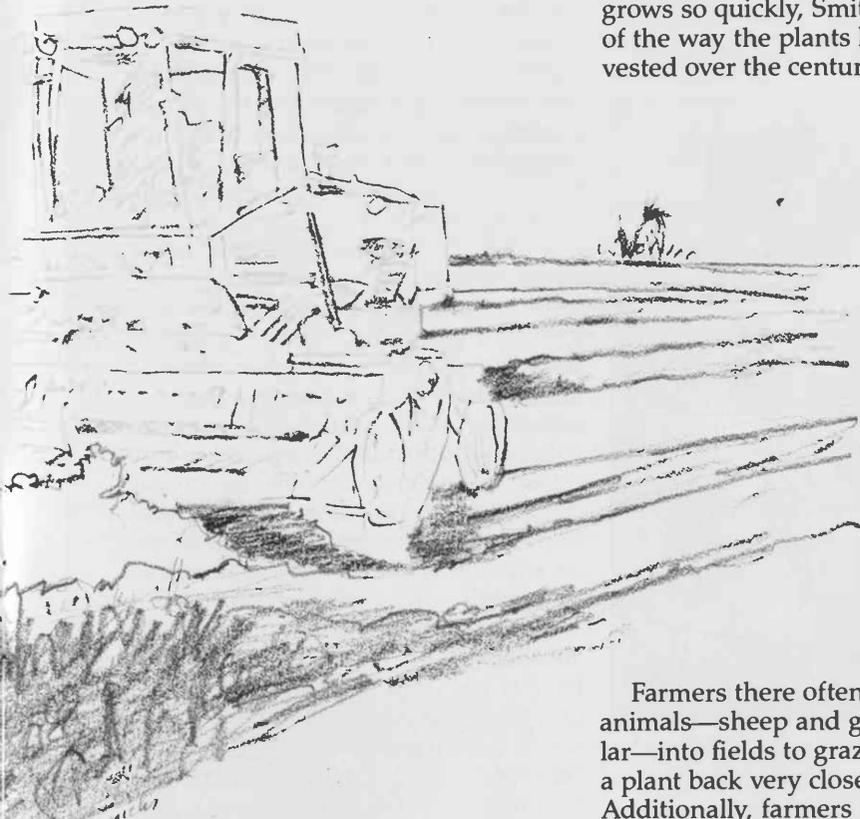
duce most of their new buds at the base of the primary stem, rather than higher on the branches. When the plant is harvested, young buds at the base of the stem, very near the ground, are protected and can continue growing. Arizona alfalfas produce new buds higher on the branches. Mechanical harvesting removes the young buds, and plants take longer to regrow.

Smith is experimenting at the UA Campus Agricultural Center in Tucson, crossbreeding 80 types of U.S. and Middle Eastern alfalfas, searching for a plant offering Arizona the optimum in alfalfa.

"We began looking at this three years ago and are beginning to get good results," he says.

Arizona's relatively warm winter climate is ideal for his experiments because plants can grow essentially year-round, decreasing the time needed to yield results. His research should provide information others can use to develop improved alfalfas for specific regions in the Southwest, and also more types of arid-adapted seed that commercial plant breeders can offer alfalfa growers.

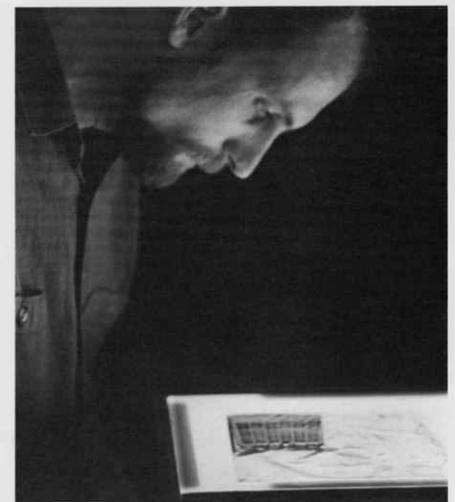
"Really, our major product is knowledge," Smith says. "We're trying to define the 'perfect' alfalfa plant for desert conditions, using Middle Eastern alfalfa as our starting point."



Alfalfa grows in two worlds. Alfalfa harvested by hand from small plots in Mid-Eastern countries regrows rapidly, but doesn't survive long. Mechanically harvested alfalfa from large fields in Arizona has the opposite qualities.

Farmers there often allow foraging animals—sheep and goats in particular—into fields to graze. Animals eat a plant back very close to the ground. Additionally, farmers harvest alfalfa using hand sickles, also cutting very close to the ground.

Adapting to this form of management, Middle Eastern alfalfas pro-



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