inferior growth of fibers and ovules, as compared with the liquid medium.

A series of experiments were conducted to investigate the effects (singly and interactions) of four classes of naturally occurring plant growth substances. The effect of gibberellic acid (GA) is shown in photo 3. As the concentration of gibberellic acid increased from 5×10^{-9}M to 5×10^{-6}M, the total fiber formed on cotton ovules increased. Both abscisic acid (ABA) and kinetin (K) inhibited fiber development at concentrations of 5×10^{-6}M and greater. Gibberellic acid largely overcame the inhibitory effect of ABA and K. Preliminary results indicate that indoleacetic acid (IAA) also promotes fiber development when supplied externally to the culture medium at concentrations of 5×10^{-6}M. The extent of growth promotion by GA and IAA, on ovules cultured in vitro, varies with the environmental conditions under which the parent plants were grown.

In a two week culture period, fiber length of ovules grown in vitro closely approximate that produced by intact plants grown in a glasshouse. As yet full elongation of fibers (at least one inch) has not been achieved. However, ovules have been cultured for 2½ months, with only one change of medium, and the embryos developed from the few-celled stage (2 days postanthesis) to mature seedlings. Photo 4 shows an intact seedling grown from the proembryo stage to a normal plant, entirely within a flask.

Ultimate goal

Cotton Incorporated initiated and continues to support this cotton fiber physiology program at the University of California, Riverside. The ultimate goal is to obtain information necessary to impose external controls for increasing yield and quality of marketable cotton fibers. The necessary procedures have been developed for culturing isolated cotton ovules from fertilization to maturity of the embryo. This accomplishment provides a working research tool to investigate the physiology and biochemistry of fiber development. The Cooperative State Research Service has recently made a grant to the University which will permit expansion of this research program.

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ALTERNATIVES DRYLAND FARM

. . . other crops, and may—or may not worth the change

LELAND S. FREY

TO KEEP UP WITH the continuously changing conditions under which they operate, farmers need some way to examine and to evaluate the alternative uses for their land. For example, thousands of acres now used for dryland crops can be developed for irrigation. But will it pay to do it? This study was made to evaluate the alternative agricultural uses for land now being used for dryland farming. The study was based on an area in Tehama County where ir-

TABLE 1. ANNUAL COSTS PER ACRE WITH BARLEY GROWN EVERY OTHER YEAR, ALTERNATING WITH FALLOW, ON AN 80 ACRE LAND PARCEL

Yield per acre: 1,500 lbs

Cultural costs per acre*	$24.41
Harvest costs:	
Combine	5.00
Haul grain	1.13
Cash variable costs per acre	30.54
Cash fixed costs:	
Property taxes (2 years)	9.00
Insurance & incidentals (2 years)	4.50
Total cash costs per acre	44.04
Depreciation	-0-
Two years costs per acre	44.04
Annual costs per acre	$22.02
Added costs:	
Management @ 5% gross income	.79
Opportunity interest @ 5% Average investment	11.25
Total annual cost per acre	$34.06
Cost per CWT barley	$ 2.27

* Including the following operations: plowing, disking, harrowing, fertilization, planting, harrowing, spraying weeds; plus interest and miscellaneous costs.

TABLE 2. ANNUAL COSTS PER ACRE WITH GRAIN SORGHUM ON AN 80 ACRE LAND PARCEL, WITH ALL EQUIPMENT WORK DONE BY CUSTOM OPERATOR

Yield per acre: 4,000 lbs

Cultural costs*	$ 79.10
Harvest costs	
Combine	10.00
Haul grain	3.00
Cash variable costs per acre	92.10
Cash fixed costs:	
Property taxes	12.30
Insurance & incidentals	6.15
Total cash cost per acre	110.55
Depreciation	12.30
Annual cost per acre	$122.85
Added costs:	
Management @ 5% gross income	4.20
Opportunity interest @ 5% Av. Invest.	26.65
Total annual cost	$153.70
Cost per CWT	3.84

* Including the following operations: chiseling, disking, floating, fertilization, disking, harrowing, planting, spraying weeds, cultivating 3 times, irrigating 10 times, spraying insects; plus interest and miscellaneous costs.

TABLE 3. ANNUAL COST PER ACRE WITH CANNING OLIVES ON AN 80 ACRE LAND PARCEL WITH ALL EQUIPMENT WORK DONE BY CUSTOM OPERATOR

Yield per acre: 2½ tons

Cultural costs per acre*	$127.82
Harvest costs:	
Picking and hauling @ $130	325.00
Cash variable costs per acre	$452.82
Cash fixed costs:	
Property taxes	28.30
Insurance and incidentals	14.15
Total cash costs per acre	$495.27
Depreciation	28.30
Annual cost per acre	$523.57
Added costs:	
Management @ 5% of gross income	28.13
Opportunity interest @ 5% of Av. Invest.	46.65
Total annual cost per acre	$598.35
Cost per ton olives	$239.34

* Including the following operations: pruning, brush disposal, fertilization, shredding cover crop, irrigating 12 times, pest control; plus interest and miscellaneous costs.