Specialty and Non-Traditional Crops

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The diversified nature of Kansas agriculture coupled with low prices for more traditional farm commodities force producers to search for alternatives. Other reasons for interest in non-traditional crops include: a small, localized or specialized market for a particular commodity; a substitute crop after the traditional crop has failed; and publicity for new crops by farm news media.

Considerable research has been done in Kansas on non-traditional crops showing that many crops can be grown in here. However, there are factors that affect their acceptance as a viable, profitable alternative for producers. Before deciding to plant a non-traditional crop, producers need to look at four very important factors: first — the demand for the product as reflected in the price; second — the availability and/or location of the nearest market outlet; third — the cost of production which includes variable and fixed costs; and fourth — the crop's suitability to the Kansas environment and yield potential. If any one or combination of these factors are not met the crop should not be considered for large scale production.

Demand for the products that come from these crops is generated by the consumer. Consumers have thousands of choices in food stores and restaurants where they decide what they are willing to buy and pay for the product compared to other products. Similarly, if the crop is to be used for livestock feed then it's in direct competition with other feed ingredients. The ultimate use to be made of the crop should be well in mind when considering non-traditional crops. The prices paid for the crop is determined by the use and the consumer buying the product. The objective is to know what price to expect and the location where the product is to be sold or used.

The availability and location of a market are paramount factors in a specialty or non-traditional crop's acceptance. All too often, producers plant an alternative crop thinking it will be a panacea, but ends up a nightmare because they have no place to market it. With some crops if more than a few producers grow them the local or regional market may be flooded and prices fall; however, with others, large quantities must be available to entice buyers to purchase them in a given locale. If a local market exists the price has to be high enough to cover the fixed and variable costs of production to be profitable, but if the crop has to be transported to a market because no local one exists the hauling cost has to been considered as a variable cost.

These new crops often require different machinery, labor and management skills. A crop budget should be prepared to determine if the estimated returns will cover all production costs. If there are no exact figures for a particular area then producers can start with a small acreage to determine what it takes to grow the crop and the costs involved. Careful records should be kept.

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Table 1. Plant characteristics, uses and production practices of various non-traditional crops.

Crop	Area of Adaptation	Uses	Crop Characteristics: Plant Height	Crop Characteristics: Maturity Days	Crop Characteristics: Seeds/lb	Crop Characteristics: Test wt lbs/bu	Suggested Cultural Practices: Planting: Date	Suggested Cultural Practices: Planting: Rate lb/a	Suggested Cultural Practices: Final Plant Population/a	Suggested Cultural Practices: Row Spacing	Suggested Cultural Practices: Plant Depth	Pests/Problems/ Special Requirements
Amaranth *Amaranthus* (species)	Great Plains	Human, livestock feed	4-8ft	125-150	650,000	—	70° soil temp	1-2	120,000	15-30"	1/2"	Poor competitor— slow early growth Lygus bugs Shattering, lodging Pythium Cannot tolerate poorly drained soils Susceptible to triazine herbicides Grain drying necessary Excellent grain quality
Buckwheat *Fagopyrum* (species)	Northern US (China origin)	Human food	2-5 ft	90	15-25,0000	48	May-June	40-55	—	6-12"	1/2" - 2"	Shattering and lodging Susceptible to numerous herbicides Direct harvest or swath Does well on poor or acid soils
Popcorn *Zea mays*	Corn Belt	Human, livestock feed	5-7 ft	100-120	2,500-4,500	65	April-May	—	Dryland 16-24,000 Irrigated 22-30,000	30"	1-2"	Seed rots and seedling diseases Stalk and root rots Corn rootworm, wireworms and cutworms Drying or forced air usually necessary (under 100°F) Slower cylinder speeds and wider concaves necessary
Mungbeans *Phaseolus aureus*	Oklahoma-Texas (Asia origin)	Human food, livestock forage and green manure	1-3ft	60-90	11,000	50	June-July	10-15	—	21-28"	1-2"	Seedling diseases Shattering Needs to be inoculated Swath for harvest Keep fertilizer away from seed
Cowpeas *Vigna sinensis*	Oklahoma-Texas Southeastern US (Africa origin)	Human food, livestock feed and green manure	1-3ft	90	3-6,000	60	May-June	12-25	—	Drilled or wide	1-2"	Charcoal rot, root rots Fusarium wilt, Cowpea curculio, corn earworm Needs to be inoculated Harvesting procedure depends on how the crop is to be marketed
Guar *Cyamopsis tetragonoloba*	Oklahoma-Texas (India origin)	Food additives Industrial-cloth and paper drying, oil drilling green manure	2-4 ft	120-140	15,000	60	70" soil temp	8-10	90-120,000	10-20" 36-40"	1-1 1/2"	Bacterial blight, southern blight Guar midge Needs to be inoculated Drought resistance Direct harvest Fits well into rotations
Fababeans *Vicia faba*	Pactific northwest California	Livestock forage and feed	2-6 ft	100-110	1,000	70	April-May	150-175	—	6-10"	1-2"	Sclerotinia, pod blight White mold; grasshoppers Shattering Needs to be inoculated Responds to irrigation Swath for harvest
Lupines *Lupinus* (species)	Gulf coast states	Livestock forage green manure	1-2"	75-90	1,500-2,000	60	Feb.-Mar.	90-150	—	Drilled	2-4"	Winterkill; Phytophthora root rot Bitter type contains alkaloids Needs to be inoculated Requires vernalization to produce grain Does well on sandy, well-drained acid soils

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Millet	Central Great Plains						June-July		**60-90,000**	6-12"	< 1"	Poor seedling emergence &vigor Birds, kernel smut & head smut
Foxtail *Setaria italica*	(China origin)	Livestock forage & feed	2-4 ft	75-90	220,000	50		10-20				Chinch bugs, greenbugs Drought tolerant
Proso *Panicum milaceum*	(China origin)	Birdseed	2-4 ft	60-90	80,000	56		5-15				Needs warm soils Sensitive to cool temperatures during heading
Pearl *Pennisetum* species	(African origin)	Human food (grain type) (forage type)	3-6 ft 7-10 ft	75-100	85,000	56		3-6				Needs warm soils
Sainfoin *Onobryehis viciaefolia*	Northwest US	Livestock forage	1-2 ft	perennial	25,000	—	Fall & Spring	25-30	10 plts/ sq ft	Drilled	1-1 1/2"	Only 1 cutting with slow regrowth; Crown rots Needs to be inoculated Does well on heavy soils with pH of 7.0-8.0
Broomcorn *Sorghum bicolor*	Central Great Plains	Brush for brooms	6-12 ft tall 3-6 ft dwarf	90-130	25,000	44-50	April-June	2-4	18-40,000	30-36"	1-2"	Considerable hand labor Chinch bugs, greenbugs and other sorghum insects and diseases Standard and dwarf types
Kenaf *Hibiscus cannabinus*	Southeastern US & Central Great Plains	Textile fiber	8-20 ft	Full season	18,000	—	May	6-8	75-100,000	20-30"	1/2 - 1"	Root knot nematode, Rhizoctonia, Gray mold Will not tolerate standing water or water-logged soils Fast growing and competitive
Kochia *Kochia scoparia*	Great Plains	Livestock forage	2-4 ft	frost	—	—	May-June	4-8	52-150,000	drilled	1/4-1/2"	Contains sodium & potassium oxalates; nitrate poisoning may occur Grazing cattle may develop sore eyes and noses Requires several clippings to keep plants from becoming too stemmy and fibrous
Comfrey *Symphytum* (species)	Northern & Northeastern United States (Europe origin)	Livestock forage	2-4 ft	—	—	—	April-May	—	—	30-48"	2-4"	Inferior crop quality and yields Grazing destroys plants Ensiling difficult due to high moisture content Propated vegetatively due to poor seed yields Root cuttings should be 1 1/2 to 6" long
Cotton *Gossypium hirsutum*	Southern US	Fiber, vegetable 8 industrial oil	2-4 ft	120-130	4,000	28-33	May-June	15-25	50-70,000	30"	1-3"	Rhizoctoria, Phythium, Fusarium Extremely sensitive to 2,4-D Specialized harvesting equipment needed
Sesame *Sesamum indicum*	SW-United States (tropical origin)	Edible & industrial oil Confectionary (seed)	3-5 ft	90-120	160,000	37	70 °F soil temp	1	40-50,000	20" or wider	1-2"	Poor competitor; frost injury Bacterial & fungal leaf spots; Charcoal rot; Fusarium & Verticillum wilt; aphids, thrips & stink bugs Requires 150 frost free days Contract market Shattering & non-shattering varieties Drought tolerance Can be irrigated

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Safflower *Carthamus tinctorius*	Western United States (near East origin)	Edible & industrial oil	2-5 ft	110-150	8-13,000	45	60° F soil temp	15-40	130-170,000	6-12"	1-2"	Poor competitor for 3-4 weeks Does not tolerate standing water Rust, Verticillum wilt & Phytophthora root rot Plant early Moderately drought tolerant Good standability Salt tolerant Can be irrigated
Flax *Linum usitatissum*	Northern Great Plains (Mediterranean origin)	Industrial oil, fiber	1-3 ft	90	82,000	56	March-April	35-50	—	6-8"	3/4- 1 1/2"	Poor competitor Fusarium wilt, rust, pasmo & aster yellows; cutworms, wireworms, grasshoppers Do not plant on poorly drained soils. Frost injury during seedling stage Plant early Crop rotation required Not salt tolerant Direct harvest or swath
Sunflower *Helianthus cinnuus*	Great Plains (also area of origin)	Edible oil Confectionary (seed)	3-7 ft	90-100	5-8,000	24	April-July	—	15-25,000	30"	1-3"	Sclerotia, Rhizopus head rot, Phoma black stem, head moth, head clipping weevil, stem and root weevil Can be planted as full season or doublecrop Responds to irrigation Extensive root system Crop rotation needed
Crambe *Crambe abyssinica*	Canada & Northern Great Plains, Midwest Southeast	Industrial oil	3 ft	120	86,000	27	April	8-15	650,000	6-14"	1/2-1"	Lygus bugs & cabbage maggot Very few pests known Seed shattering Direct harvest or swath Can be irrigated
Rape *Brassica napus* *Brassica campestris*	Canada & Great Plains	Industrial & edible oil	2 1/2-5 ft	280 80-90	160,000 240,000	50	Aug.-Sept. Feb.-March	3-8	—	6-14"	3/4-1 1/2"	Poor competitor Blackleg, Sclerotinia, flea beetle Seed shattering Plant early to insure winter survival Needs well-drained soils, Swath for harvest Crop rotation required to prevent diseases Some potential for forage
Meadowfoam *Limnanthes alba*	Pacific northwest	Industrial oil	1-1 1/2 ft	July	—	—	Sept-Oct	30-40	—	6-7"	1/4-1/2"	Shattering Adapted to poorly drained soils Requires insect pollination Swath for harvest
Castor bean *Ricinus communis*	Southern and Southwestern United States (Africa-India origin)	Industrial uses	3-5 ft (Dwarf varieties)	125-150	1.000	50	April-May	10-15	—	>30"	1-3"	Alternaria and bacterial leaf spot Cotton root rot, southern blight Cutworms and wireworms Seeds contain ricin (poisonous) Direct harvest Responds to irrigation, but excessive water will hurt yields Requires 140-160 frost free days

Some of the costs that need to be considered are:

	$/acre	
1. Variable costs		
Labor requirements (hours x rate/hr)	_____	
Seed costs	_____	
Pesticides	_____	
Fertilizer	_____	
Fuel — total used for each crop	_____	
Machinery— new (or can old be used with minor modifications)	_____	
Drying — handling — special handling	_____	
Miscellaneous	_____	
TOTAL VARIABLE COSTS		_____
2. Fixed costs		
Taxes	_____	
Interest on investment	_____	
Depreciation on equipment	_____	
Rent for rented land	_____	
Interest and insurance on crop machinery	_____	
Miscellaneous	_____	
TOTAL FIXED COSTS		_____
3. TOTAL COSTS = total variable plus total fixed costs		_____
4. Yield per acre harvested	_____	
5. Price per unit or value as forage/acre	_____	
6. Gross returns per acre = yield times price (line 4 x line 5)	_____	
This should be equal to or greater than line 3 if this crop is to be grown over an extended time period.		
7. Returns over variable costs = line 6 minus total variable costs (line 1) - This will have to be a positive figure before this crop should be considered for even one season.		

Comparisons can be made for each crop to quoted prices if the total variable cost figures are divided by the units of production such as pounds, bushels, hundredweight, etc.

1. Variable costs divided by units =	_____
2. Fixed costs divided by units =	_____
3. Total costs divided by units =	_____
4. Compared to market price (contract price)	_____

The change to alternative crops can have substantial or minimal impact on the farm operation. Costs should be divided by the number of years the crop is to be grown to estimate some of the machinery variable costs. This type of analysis will help provide information concerning whether or not a non-traditional crop can be grown economically. Knowing fixed and variable costs is as necessary as knowing prices that are offered.

Pricing the crop can be done a number of ways depending on what kind of price risk the producer is willing to assume. Some crops can be priced with a forward contract. The producer is guaranteed a price if the quality, quantity and the time requirements are met as spelled out in the contract. Often the producer wants to assume the full price risk and will deliver the crop and price it at the time of delivery. For some crops a group of producers can pool their production into larger units to sell. Cooperatives or other types of legal units can be formed to provide more volume to attract buyers for the crop.

Many crops not normally grown in Kansas may have potential in certain environments, but producers must look closely at growing requirements of specialty or non-traditional crops and match them to their growing conditions. Soil types vary dramatically across the state and may influence a crop's suitability to a given area.

Similarly, the growing season or frost-free period ranges from approximately 150 days in northwestern to 200 days in southeastern Kansas and dictates what crops have the potential to grow, mature and produce satisfactory yields.

Table 1 was prepared to indicate general crop characteristics, suggested cultural practices, special requirements, problems and uses of various specialty or non-traditional crops. This is not a complete list of non-traditional crops nor is it implied that these crops can be grown economically in Kansas. If more information is needed, interested individuals should contact Cooperative Extension and Experiment Station personnel to determine if research has been conducted on a specific

crop and if it can be grown here. If information is unavailable, production of the crop should be restricted to small acreage until the producer has a good grasp of the production requirements and a market located.

In summary, before the decision to plant a specialty or non-traditional crop is made the producer must determine if there is a demand for the crop, if there is an available market nearby, the cost of production, and the crop's suitability to local growing conditions. Other factors the producer must consider is the need for specialized equipment, handling and labor requirements, pest problems, fertility needs and other general production needs the crop might require. The bottom line in producing any crop is whether the crop will return more dollars than it costs to produce it.

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COOPERATIVE EXTENSION SERVICE, MANHATTAN, KANSAS

M F - 8 4 4 January 1987

Issued in furtherance of Cooperative Extension Work, acts of May 8 and June 30, 1914, as amended. Kansas State University, County Extension Councils. and United States Department of Agriculture Cooperating, Richard D. Wootton, Associate Director,

1-87-5M; 2-88-2M; MS 5-94-2M

File Code: Crops & Soils 1-4