Table 4. Germination percentage of two cultivars and two lines of safflower harvested by hand and tested at 20 C after five periods of soaking.

Treatment (soaking hours)	Lines				
	Gila	Frio	A12417	A101	Mean
5	95.3	97.0	95.8	81.8	92.4bc
10	92.8	86.5	95.0	86.5	90.2cd
15	85.5	72.0	93.0	88.5	84.8d
20	72.0	73.0	83.0	78.3	76.6
25	57.5	70.3	78.5	72.8	69.8
Control	95.5	99.0	96.5	92.0	95.8b
Mean	83.1a	83.0a	90.3	83.3a	84.9

Means followed by the same letter are not significantly different at the .05 level.

Field emergence and laboratory germination percentages of the four entries of safflower from both hand and machine harvested seed are presented in Table 5. Field emergence values of the normal hull cultivars and thin hull lines were not significantly different from each other, but significant differences existed between the two groups. Similar relationships existed for laboratory germination percentages. Field emergence percentages were considerably higher for seed from the hand than from the machine harvested lots. Non-visible mechanical damage inflicted during harvest accounted for a reduction of almost 20% in laboratory and field emergence percentages. The germination percentages obtained under field conditions were not as high as those obtained when using optimum conditions of temperature in the laboratory. Entries that gave a higher germination percentage in the laboratory also gave a higher field emergence percentage.

Table 5. Field emergence and laboratory germination percentages of two cultivars and two lines of safflower from both hand and machine harvested seed.*

Lines	Hand Harvested Seed		Machine Harvested Seed	
	Field emergence (%)	Laboratory germination (%)	Field emergence (%)	Laboratory germination (%)
Gila	94.5a	96.7g	71.0c	76.9e
Frio	94.0a	96.7g	77.0c	77.8e
A12417	87.3ab	92.7h	59.0d	73.4f
A101	82.0b	90.5h	67.3cd	71.3f
Mean	89.4	94.1	68.6	74.8

*Laboratory germination percentages refer to those tested at 15/20 C alternations.

Means followed by the same letter are not significantly different at the .05 level.

Studies On Cassava (*Manihot esculenta*) As a Potential Crop in Arizona

M. Porto and V. Marcarian, Plant Sciences Department

Cassava is a perennial shrub well adapted to warm climates. Cassava roots are used as an energy source for over 400,000,000 people throughout the world. Both roots and foliage are used extensively as animal feed.

New perspectives for production of alcohol from their roots are increasing the cultivation of this plant in many areas of the world. In addition, over one million tons of pellets and chips with indus - trial application are shipped to the U. S. and Europe yearly.

Preliminary studies have indicated that cassava has a good potential for cultivation under Arizona environmental conditions. Data obtained from both Tucson and Yuma reveal that this "tropical" plant can tolerate unfavorable soil moisture levels and can produce leaves, stems and roots comparable to traditional cassava producing countries. Amounts of starch, alcohol and protein obtainable from 18 month old cassava plants grown in Tucson are shown in Table 1.

Four cassava cultivars, MVen 218, CMC 40, MCol 22 and MIta 1158 were grown in Tucson. Water stress was imposed two months after planting and lasted for 80 days. The cultivars reacted differently to water stress. All four cultivars showed reductions in growth and yield under stress (Table 2). However, MCol 22 appears to tolerate drouth, changing the least in growth and biomass production. MCol 22 had a lower transpiration rate than the other cultivars (Table 3), and a much higher diffusive resistance.

These studies are being conducted on a larger scale this year. In addition, a trial nursery consisting of 28 cultivars is being observed for identification of potentially superior cassava germplasm.

Once adapted cultivars are identified and if economic root yields are obtained, production practices suitable for Arizona can be easily developed since cassava is an established crop with a long agricultural history. The use of the roots for starch production and the vegetative parts as animal feed render this a dual purpose crop.

Table 1. Projected amounts of starch, anhydrous alcohol and protein obtainable from 18 month old cassava plants. Tucson, 1981.

CULTIVAR	STARCH (g/plant)	ALCOHOL (l/plant)	CRUDE PROTEIN (g/plant)
MVen 218	2,835	1.6	514
MCol 22	2,269	1.3	666
MMex 59	2,273	1.3	517

Table 2. Fresh and dry biomass (g/plant) produced by 4 cassava cultivars under two different regimes of water availabilty. Tucson, 1981.

CULTIVAR	LEAVES		STEMS		ROOTS		TOTAL	
	Fresh	Dry	Fresh	Dry	Fresh	Dry	Fresh	Dry
MVen 218:								
NS	1921	572	3554	825	307	97	5782	1494
S	872	237	1942	449	142	60	2956	746
CMC 40:								
NS	1811	480	3902	919	797	209	6510	1608
S	710	202	2300	409	317	72	3327	683
MCol 22:								
NS	1664	431	2200	755	298	151	4162	1337
S	642	220	1360	345	192	82	2194	647
MIta 1158:								
NS	2672	778	3617	811	455	168	6744	1757
S	863	228	2059	501	150	42	3072	771

Table 3. Transpiration, diffusive resistance and leaf temperatures of 4 cassava cultivars. Tucson 1980/1981.

CULTIVAR	November 15, 1980			July 23, 1981		
	T*	DR**	LT***	T	DR	LT
MVEN 218	9.68	1.68	24.96	41.64	0.42	34.29
CMC 40	5.43	4.38	25.80	38.66	0.44	33.81
MCol 22	2.01	21.70	25.90	30.98	1.79	35.71
MIta 1158	5.49	3.04	24.90	44.99	0.35	33.92

(*) Transpiration rates in $ug.cm^{-2}.\ sec^{-1}$

(**) Diffusive resistances in sec.cm.

(***) Leaf temperatures in °C.

Growing Seasons in Arizona

G. L. McColm, Agronomist, retired,
R. E. Dennis, Extension Agronomist and Yassin Dagash,
Graduate Student, University of Arizona

Summary

Arizona presents a diversity of growing seasons, comparable to those found from the Gulf Coast to the Arctic Circle. These variations result primarily from differences in elevation and topography.

The growing season is the time interval with favorable temperatures for a specific kind of plant. It is determined primarily by heat from the sun. The amount of heat, extremes of heat and cold, and variation between day and night temperatures are major factors determining growing seasons and plant adaptation. When growing seasons for an area are carefully considered, crops may be selected and optimum planting dates and probable harvest dates may be determined.

The variations in climate from year to year are much less in Arizona than in midwestern states. Located far south, beyond the normal range of the polar air masses, Arizona's protected basins and mountain valleys are well suited to crops that are best adapted to areas having a climate that can be predicted quite accurately.

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Climate of Arizona

The climate of Arizona is much more than hot dry summers and mild dry winters. An extreme diversity of topographic features with elevations ranging from 137 feet above sea level to more than 12,600 feet has given the state a wide range of climatic conditions.

The lower desert valleys of southwest Arizona have nearly a year-long growing season for many crops. At higher elevations the length of growing season is much shorter, in some instances less than two months. Climate records for the state show that the length of growing season is reduced by about 30 days for each increase of 1000 feet in elevation.

Areas of the state having the longest period for plant growth have the least rainfall, and those having the shortest growing season have the most rainfall. The amount of rainfall varies from less than five inches for most of Yuma County to more than 25 inches for the higher elevation areas. The average annual precipitation for Arizona is about 12.5 inches.