Summer is the traditional off-season for desert farming communities. Summer brings temperatures too high for most crops, so fields are fallowed and families go on vacation. But farmers have been looking at cover crops as an alternative to fallowing their fields in the summer. For desert vegetable growers, cover crops have been grown before for after carrots and peppers, and fit well between fall lettuce crop and spring melons.

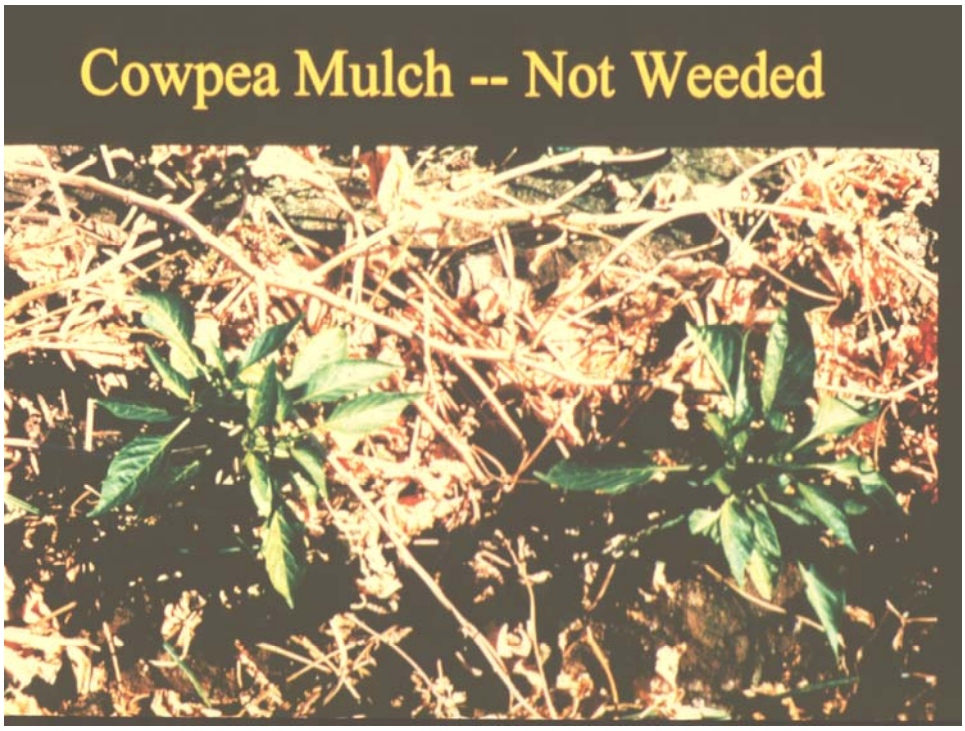
Why Plant Cover Crops?

Because cover crops are not harvested for direct profit, the obvious question is "Why bother?" Cover crops are grown primarily to enrich the soil, but also help to reduce dust pollution. Desert soils are notoriously low in organic matter, the carbon-based substance that makes Midwestern soils dark and fertile. Organic matter does so many things to improve plant growth that many books have been written on the subject. But the most often mentioned benefits are the improved ability to hold nutrients and water and support root growth. Some cover crops are legumes that add nitrogen to the soil. This is particularly useful to organic growers who have few economical sources of nitrogen fertilizer, but substantial increases in synthetic fertilizer prices have helped fuel interest in planting legume cover crops by non-organic growers as well.

The University of California, Cooperative Extension, and the USDA have identified cowpea as an ideal summer cover crop for hot-summer areas. Cowpea cover crops are cost effective because they enrich the soil with organic matter, add over 100 lbs per acre of nitrogen, and have other harder to define benefits for crops grown in rotation with

them. Spurred by rising fertilizer prices and fewer available pesticides, cowpea cover-crop acreage in California and Arizona has increased dramatically from nearly none in 1995 to several thousand acres on both organic and conventional farms.

Experiments in the Coachella Valley found that cowpeas significantly increase yields and net returns of fall-planted lettuce and the subsequent cantaloupe crop. Profits improved even more if the system was farmed organically. Organic produce can be more difficult and costly to grow, but often commands a higher price. Cost studies found that profits for organically-grown lettuce were three times higher than for conventionally-grown produce when growers were paid 30% more for organic than conventionally-grown lettuce.



Production Systems

Cowpea is very adaptable to a variety of production systems. It can be grown using either sprinkler or furrow irrigation with one to two rows on 30 or 40 inch beds. It can also be sown on flat ground (as long as drainage is good) with grain drills using 7 or 14 inch spacing. Seeding rates between 30 to 50 pounds per acre are recommended for cover crops. A good cover crop needs at least seven weeks to develop large amounts of organic matter and fix large amounts of nitrogen. Cowpeas will vine out, so be aware of that in managing your irrigation system. We have never observed poor growth or plant health problems due to extremely high temperatures (120-130 F) as long as soil moisture is adequate. Cowpea tolerates drought well, but growth slows and optimum production of vegetation will not occur under water deficit conditions. No fertilizer is required, and cowpea cover crops do a good job of sucking up excess nitrogen and phosphorous left in the soil from previous crops. Good stands are obtained if the seeds are planted to moisture about one inch deep. Deeper sowing (up to 4 inches in light soils) can be done

in order to place seed into moisture, but only loose soil should be used to cover the seed. Emergence is rapid-about 4 days under warm summer conditions in the desert. Under most conditions, irrigation is not required for at least one week after emergence. Crusting of the soil surface prior to seedling emergence can reduce stands so this should be avoided. In the desert, cowpea cover crops can be established from April-early August.

At harvest, the cowpea vegetation is easily incorporated into the soil. Provided soil temperatures are not too low, breakdown of the crop residue is rapid so that nutrients are available for the subsequent crop.

Summer cowpea cover crops have been shown to decrease weeds and other pests when they are managed for vigorous growth. Cover crops of cowpeas are sometimes attacked by whiteflies or cowpea aphid that could reduce yields. New cultivars are being developed at UC Riverside with better resistance to aphids and more broad-based resistance to root-knot nematodes.

Varieties, Sources of Seed and Inoculants

3

Varieties

The most familiar type of cowpea is blackeye pea. While blackeyes are tasty and nutritious, they are used primarily as fresh-shelled peas do not make a good cover crop. In the desert, blackeyes begin producing pods before they have a chance to produce much of the vegetative growth cover crops need to enrich the soil The larger seeds of blackeyes increase planting costs. Instead of blackeyes, the cowpea cultivar Iron Clay is generally used for cover crops. Iron Clay produces the abundant amounts of organic matter and nitrogen needed to enrich the soil, resists common forms of root-knot nematode (*Meloidogyne incognita*), and grows well in our desert summers with moderate irrigation. The seed of Iron Clay is less than half the size of blackeyes, and not as costly. Iron Clay has been shown to produce 100 pounds of nitrogen per acre, a great start for the cash crops that follow. Iron Clay grows quite erect for most of the season, but often lodges at the end. The erect growth habit makes it amenable to mechanical cultivation if this is needed for weed control. Studies we have done have shown that such erect growing cowpeas are better competitors with weeds than more prostrate varieties. This result was contrary to our initial expectation, that more prostrate varieties would be better competitors because they cover the ground quicker. Other cowpea varieties such as 'Speckled Purple Hull' also grow well in the desert, however, the variety 'Chinese Red' should be avoided because it is highly susceptible to root-knot nematodes and seems more attractive to cowpea aphid than other cowpea varieties we have experience with. Also, cowpea varieties 'Lady Pea' and 'Combine Cowpea' have been observed to perform poorly in the desert because they flower too early resulting in low vegetative yields.

Several US companies carry cowpea cover crop seed. These include Champion Seed in Coachella, CA (760-398-2729), Lockwood Seed and Grain in Chowchilla, CA (559-665-5702), Adams-Briscoe Seed Company in Jackson, Georgia, (770-775-7826), Seedland in Florida (888- 820-2080**),** C.T. Smith Company in Texas (830-569-2140), and the Wax Co. in Mississippi (662-256-3511).

. Like other legumes, cowpeas form a symbiotic relationship with a bacteria (Rhizobia) that forms root nodules that supply the plant with nitrogen from the atmosphere. Rhizobia inoculants specific to the legume species are added to the seed at planting. This helps to ensure high rates of nitrogen fixation by the plant. Many soils will already have Rhizobia present, but the application of inoculant ensures that effective strains will be established in prolific numbers. Inoculants are inexpensive 'insurance' and relatively easy to apply to the planting seed. They can usually be obtained from seed suppliers, or can be obtained from a manufacturer such as Becker Underwood, formerly Urbana Laboratories of St. Joseph, Missouri (http://www.beckerunderwood.com/). It is important to order inoculant compatible with cowpea, so this should be specified when ordering.

A good web site for general information on cover crop selection and uses is the University of California's Sustainable Agriculture Research and Extension Programs Cover Crop Resource page: http://www.sarep.ucdavis.edu/ccrop/index.htm.

Cowpea Seed Suppliers

Adams-Briscoe Seed Company
P.O. Box 19 325 E. Second St.
Jackson, GA. 30233-0019
Phone: (770) 775-7826 Fax: (770) 775-7122
Email: abseed@juno.com

Champion Seed in Coachella, CA (760) 398-2729

C.T. Smith Company in Texas (830) 569-2140)

Lockwood Seed and Grain (Greg Wittenborn)
26777 Chowcilla Blvd.
Chowchilla, CA 93610.
Phone: (559) 665-5702
Fax: (559) 665-4911.
Email: seedsmangmw@worldnet.att.net

SEEDLAND, Inc.
9895 Adams Rd
Wellborn, FL 32094
Phone: (888) 820-2080
Web: www.Seedland.com

Turner Seed Co.
211 County Road 151
Breckenridge, TX 76424-8165
Toll-Free Tel 800.722.8616
Fax Line (254) 559-5024
Email: julie@texasisp.com

The Wax Company
P. O. Box 60....
Amory, MS 38821
Phone: (662) 256-3511
Fax(662) 256-9720

Email: barry@wax.ms

Authors:
Milton McGiffen Jr., CE Specialist
Jeff Ehlers, Associate Specialist
Jose Aguiar, Farm Advisor