

DRY BEAN PRODUCTION AT LOWER ELEVATIONS OF ARIZONA

Victoria Marcarian, David K. Parsons, and Robert E. Dennis,
Department of Plant Sciences 1983

Dry beans (Phaseolus vulgaris) are traditionally grown in relatively cool climates. Major bean producing states include Idaho, Michigan, Nebraska, and areas where climates are similar. Arizona and New Mexico have significant acreages most years. The bean is used for human food. It is an excellent and economical source of protein and energy.

Adaptation

At the lower elevations of Arizona, summer temperatures are usually in excess of 100F. These high temperatures may cause pollination problems and dropping of flowers and pods. Because of this, the choice of optimum planting dates is especially important.

Dry beans mature in a relatively short time, with most requiring 90-115 days. Consequently, they may often be used in a double-crop sequence. Also, the water requirement for dry beans is less than for many crops, because they are grown during the cooler time of the year. Dry beans are much less tolerant of salt than cotton, barley, and sorghum.

Market Classes

Market classes of dry beans that can be grown in Arizona include Pinto, Great Northern, Pink, Red Mexican, Black, and Small White (Navy). Other types of beans, such as Kidney, Cranberry, and Tepary, also have been successfully produced.

Source of Seed

Use certified, blight-free seed. Handle bags of seed carefully to avoid damage that may result in lower germination and reduce seedling emergence. The kind of dry bean and often the variety as well is specified in the purchase agreement.

Growing Practices

Inoculant

Although inoculation is recommended when dry beans are to be planted in soil that has no recent history of the crop, high temperatures and drying will kill the nitrogen-fixing bacteria. Recent research in Arizona suggests that a granular inoculant placed below the seed in moist soil gives best results. Granular application equipment for this operation is available. Inoculant should be fresh and stored in a cool place (below 75F) prior to use.

Soil and Seed Bed

A well prepared, pre-irrigated seedbed is desirable. The pre-irrigation moisture may carry the seedling until the third or fourth leaf stage. Care should be taken to avoid excess soil compaction and to eliminate existing hard pans, since beans are sensitive to these conditions.

Row Spacing

Many different planting patterns are satisfactory for dry beans, however, narrow rows are usually associated with higher yields. Two seed rows on 38- to 40-inch beds have produced excellent results; especially where soil and water are low in soluble salts and soil crusting is not a problem. Some growers use single rows on the tops of 30- to 36-inch beds. With this method, it is essential that every other furrow irrigation be used if salt is a problem. Dry beans are also occasionally grown on the flat, using narrow row spacing where salt problems are minimal.

Planting Rates

Plant seeds about 2 inches apart in the row so as to achieve an average spacing of 2-3 inches between plants in the established stand. With a row spacing of 30 inches, 50-70 pounds of high quality seed per acre will be required for most large-seed dry beans.

Planting Date

A soil temperature of 55F or above at seed planting depth is required for the initiation of germination. Dry beans are usually planted in mid-April or mid-July at the lower elevations of Arizona.

Planting Depths

For best results, place seed about 2 inches deep in moist soil with actual planting depth determined by seed size, soil texture, and other factors. Where beans are planted in dry soil and irrigated up, planting depths of 1 to 1.5 inches are suggested.

Fertilization

Fertilizer application for pinto beans, as for other crops, is dependent on many factors, such as soil, cropping history, and nitrogen in irrigation water. Do not place fertilizer in contact with seed. It is best to base the fertilizer application on a soil test.

Incorporate all of the phosphate during seedbed preparation. Some growers have had excellent results incorporating 30-60 pounds of nitrogen and 40-80 pounds of P205/acre prior to planting, during seedbed preparation. When phosphate only is used, an application of about 50 lbs/acre P205/acre is suggested. Applications of iron or zinc may occasionally increase yield.

When too much nitrogen is used, vegetative growth may be excessive and certain bacterial and fungal diseases may become a problem. Also, nitrogen-fixing bacteria may become ineffective. Usually post-planting applications of nitrogen are not recommended.

Irrigation

Successful growers usually apply 2-3 acre-feet of water per acre to produce a crop of dry beans, depending upon soil texture, irrigation efficiency, water quality, precipitation and other factors. Do not stress plants for water, especially at flowering and pod-filling time. Overirrigation will also depress yields. With surface irrigation, on fine-textured soil, two to three irrigations after stand establishment may be sufficient. Irrigate so as to minimize the damage that may be caused by salt.

Diseases

White fly transmitted viruses have been the most severe disease problems at the lower elevations. Most other diseases may be controlled by rotation, seed treatment, and plowing down of bean stubble during the summer rainy period. Bean rust (*Uromyces phaseoli*), Powdery mildew (*Erysiphe polygoni*), Charcoal rot (*Macrophomina phaseoli*), Sclerotinia mold (*Sclerotinia sclerotiorum*), and the Curly Top and Bean Mosaic viruses are occasional problems.

Weed-Control

There has been no University of Arizona research program for weed control in beans. Growers have used some preplant treatments for at least partial control of annual weeds. For full season control of weeds a program of cultural practices and herbicides will be required.

Avoid planting beans in fields known to be heavily populated with weeds. Frequent cultivations will help reduce weed problems. Be prepared to use hoeing as a last resort if weed densities become excessive.

Insects

The most important insects are Mexican bean beetle, Spotted cucumber beetle, White fly, Western potato leaf-hopper, seed corn maggot, bean weevil, aphids, thrips, and spider mites. Insect control problems have been minor in Arizona.

Harvesting

Beans will be ready for harvest when about 70 percent of the pods are yellow (not brown and dry) and 20 percent of the pods are green with red stripes. Keep shatter losses at a minimum by avoiding excessive pod drying. Knifing is the first step in harvest, and usually four to six rows of plants are knifed at a time. Plants should be windrowed as soon as possible after knifing and at times during the day when beans do not shatter. Irrigation may sometimes be used to increase humidity at ground level and reduce shattering. Adjust the combine so as to minimize seed damage. When a conventional combine is used, use cylinder speeds of 175-200 rpm.