Crop – Chickpea

I. History:

Chickpea (*Cicer arietinum* L.) is an ancient crop that has been grown in India, the Middle East and parts of Africa for many years. It may have been grown in Turkey nearly 7,400 years ago. Much of the world's chickpea supply (80 to 90%) comes from India where poor soil, use of unimproved varieties and low rainfall results in yields averaging about 700 lb/acre.

Most of the chickpea acreage in the United States (15,000 acres) is in California (8,000 acres) but certain areas of eastern Washington, parts of Idaho and Montana are now growing this crop successfully. This acreage has been increasing to provide chickpea supplies which formerly came from Mexico, which cut back chickpea production in favor of pinto bean.

II. Uses:

Chickpea is consumed as a dry pulse crop or as a green vegetable with the former use being most common. Seeds average about 20% protein, 5% fat and 55% carbohydrate.

Seeds are sold in markets either dry or canned. Common uses in United States are in soups, vegetable combinations, or as a component of fresh salads in restaurant salad bars.

Some livestock feeding trials have been conducted and these show chickpea to be a good source of protein for feeds, except that the amino acids methionine and cystine are deficient.

III. Growth Habits:

Plants are multiple branched, spreading growth habit annuals ranging from 8 to 40 in. tall. Some chickpea varieties have compound leaves (8 to 20 leaflets) and some have simple leaves, which are pubescent (hairy) in appearance. Chickpea leaves exude malic and oxalic acids.

Kabuli (large seeded = 800 seeds/lb) varieties are generally taller than the desi (small-seeded = 1,500 seeds/lb) varieties.

Because of its deep tap root system, chickpea can withstand drought conditions by extracting water from deeper in the soil profile.

Flowers (self-pollinated) which are borne in groups of two or three are 1/2 to 1 in. long and come in purple, white, pink or blue color depending upon variety. Each flower produces a short, pubescent pod which is 3/4 to 2 in. Long and which appears to be inflated. One or two seeds (1/2 to 1 in. diameter) are present in each pod. The seeds come with either rough or smooth surfaces and can be creme, yellow, brown, black or green in color. There is a definite groove visible between the cotyledons about two-thirds of the way around the seed, with a beak-like structure present.

IV. Environment Requirements:

A. Climate:

Chickpea is a cool season annual crop performing optimally in 70° to 80°F daytime temperatures and 64° to 70°F night temperatures. They produce good yields in drier conditions because of their deep tap root. Heavier rainfall seasons (over 30 in. annually) show reduced yields due to disease outbreaks and stem lodging problems from the excessive vegetative growth. Areas with lighter, well distributed rainfall patterns have produced the highest yield and quality chickpea seed.

B. Soil:

Chickpea does best on fertile sandy, loam soils with good internal drainage. Good drainage is necessary because even short periods of flooded or waterlogged fields reduce growth and increases susceptibility to root and stem rots.

C. Seed Preparation and Germination:

Good quality certified chickpea seed should always be used. This seed should be high in germination percentage (over 85%), free of damage, and free of weed seeds. Good quality seed does not need to be treated with an insecticide or fungicide, but if you have had past problems with Pythium or Rhizoctonia rots in your fields you may need to treat your seed prior to planting.

Plan to purchase the special strain of nitrogen fixing bacteria required for chickpea if you are planting this crop for the first time in a field. It can be purchased in peat or granular form, the latter type must be used if your seed is fungicide treated. Follow instructions supplied with your inoculant to ensure its proper use.

V. Cultural Practice:

A. Seedbed Preparation:

A firm, smooth seedbed with most of the previous crop residue incorporated is best. This will allow proper depth of planting as well as good seed-soil contact, which is essential for rapid germination and emergence. If moisture is short keep deep preplan" tillage to a minimum to prevent excessive drying in the top 2 to 3 in. of soil.

B. Seeding Date:

Chickpea is a cool season species and is frost tolerant as seedlings so seeds should be planted in early to mid-April when the small grains are planted in the Upper Midwest. Later planting dates result in shorter plants, less yield and late maturity of late formed flowers and pods. Flower and pod abortion rates increase if flowering and pod set coincide with the hottest and driest weather pattern. More research is needed in this area using currently available varieties.

C. Method and Rate of Seeding:

Chickpeas can be planted at row spacing between 6 in. and 40 in. South Dakota research showed a yield of 2936 lb/acre in 6 in. rows with only 1900 lb/acre yield production in 36 in. rows. Both row spacings had excellent weed control, and a plant population near the recommended rate of 140,000 live seeds planted per acre. Because seed size varies widely, this planting rate in pounds of seed per acre could vary from 75 to 150 lb/acre. Seeds dropped per foot for 6 in. rows should be about 2; for 15 in. rows 4 or 5 and for 36 in. rows about 10.

Seeds should be planted 1 in. to 2 in. deep using a drill or planter which can deliver the chickpea seed without damage. Good seed soil contact should be ensured with a press wheel if possible.

Because of the high cost of seed and variation in germination rates you should carefully calibrate your equipment to achieve the proper plant population.

D. Fertility and Lime Requirements:

Fertility requirements for chickpea in Minnesota and Wisconsin are not well known, but the crop will likely require the amounts of phosphorus, potassium and certain micronutrients which are recommended for other pulse or legume crops in this area. Any fertilizer application should be based on soil test level, previous crop and expected yield level. Soil should be limed to a pH of 6.0 unless a crop with a higher pH requirement is grown in the rotation. Phosphate and potash recommendations based on soil test values are given in Table 1.

If roots can be nodulated with the proper strain of Rhizobium, nitrogen fertilizer will not be necessary. Some growers may wish to provide 15 to 30 lbs of nitrogen as a broadcast treatment to enhance early seedling development.

E. Variety Selection:

Specific recent information on chickpea variety performance in Minnesota and Wisconsin is not available. Much variety development and testing has been done in recent years at the USDA-ARS and Washington State University research laboratories at Pullman, Washington; and Idaho Agricultural Experiment Station at Moscow, Idaho and this information is available. During the

1982–84 growing seasons agronomic scientists at South Dakota State University in Brookings tested a large number of lines from the germplasm collections of the International Center for Agricultural Research in Dry Areas (ICARDA) at Aleppo, Syria. The five highest yielding lines were from Syria, Turkey and Spain and were well adapted to South Dakota conditions.

F. Weed Control:

1. Mechanical: Chickpea is not very competitive with weeds so they should be planted only on fields which have few if any major weed problems, especially perennial weeds such as quackgrass and Canada thistle.

Rotary hoeing and/or field cultivating in wider row spacings should be used as necessary to control weed populations in chickpea. Early weed competition is more damaging to yield than later emerging weeds. Avoid extensive damage to plants and cultivate when leaves and stems are dry to reduce spread of disease organisms.

2. Chemical: The herbicide metholachlor (Dual) can be applied as a preplant incorporated or preemergence treatment. It gives excellent annual grass and fair to good annual broadleaf control. A rotary hoe could be used in chickpea in the same manner as with soybean. Row cultivation is not practical due to the narrow row spacing.

If annual grasses or quackgrass are abundant after the crop emerges, a postemergence application of sethoxydim (Poast) should be considered. Treat when the grasses are 4 to 6 in. tall. A 1 pt/acre rate controls most annual grasses; check the label and select the rate appropriate for your weed species. Always use 1 qt/acre of Dash or a crop oil concentrate when Poast is applied.

Chickpea has been grouped on some herbicide labels with other dry pod harvested crops such as field bean or adzuki bean. This could allow use of herbicides cleared in those crops to be used on chickpea. Read labels carefully and seek clarification from the company involved before using any herbicide on your chickpea crop. Be sure to ask a company representative, your extension agent or crop consultant for the most recent information and follow the label directions exactly. Because chickpea is a lesser grown crop in Wisconsin and Minnesota, label clearance from other states may not apply.

G. Diseases and Their Control:

Ascochyta blight, Rhizoctonia root rot, Pythium rot, Fusarium wilt, white mold, bacterial blight and certain viruses are possible disease problems in production fields of chickpea. These are typical diseases which affect other pulse or legume crops and they are accentuated by periods of high rainfall, high humidity and high temperatures.

These are best controlled by using good quality seed, proper crop rotations, proper tillage practices to bury diseased residue and disease resistant varieties if available.

Contact your extension agent or crop consultant for identification of disease organisms, threshold value determinations and control or management suggestions.

H. Insects and Other Predators and Their Control:

Because chickpea leaves, stems and pods are heavily pubescent with glandular hairs that secrete malic and oxidic acid, they suffer little direct damage from aphids and other insects. Several viral

diseases (transmitted by aphids) have occasionally been reported in chickpea fields in Washington and Idaho. Seedcorn maggot and wireworms might be expected to cause problems early in the season by attacking the germinating seed and destroying the growing point.

If a serious insect problem develops in a field, consult your local Extension office or crop consultant for information about threshold value determinations and recommendations for control.

I. Harvesting:

Chickpea can be harvested direct or swathed prior to combining depending upon uniformity of maturity and weed problems. About 1 week of good drying weather is required in the swath.

Chickpea can be swathed when the plants are yellowing and the pods are their mature color. This should be done when the plants are slightly damp to facilitate forming the swath without yield loss. When the vines, pods and seeds in the windrow are dry enough (seed moisture about 13%) the swath can be combined. Seed color is important (buyers prefer a yellowish-creme color) so greenish and brown seeds are generally unacceptable. Slight bleaching does occur in the swath. About 1% immature color seed is allowed before deductions are implemented.

Adjust the combine screen size, cylinder speed, concave clearance and air flow carefully to maintain a quality seed with little physical damage or excessive trash.

J. Drying and Storage:

Moisture content should be around 10 to 12% to prevent insect and or disease outbreaks in storage. Because of their relatively large seed size, chickpea can be dried slightly with ambient temperature air flow through thin layers in a regular storage bin.

Storage system should be carefully fumigated before storing chickpea and all storage areas should be monitored regularly to identify potential problems early.