

Crops, Rotation & Watering Schedule

BWCDD Zanjero
Training

Session #3

1/23/2008



Crops in the District



- Cotton
- Alfalfa
- Sorghum

King Cotton

- **Cotton** is a soft, staple fiber that grows around the seeds of the cotton plant, a shrub native to tropical and subtropical regions around the world, including the Americas, India, and Africa.
- The fiber is most often spun into yarn or thread and used to make a soft, breathable textile, which is the most widely used natural-fiber cloth in clothing today.
- The English name derives from the Arabic *(al) qutn*, meaning cotton.
- The term used in the 1800's and 1900's for cotton was called "King".



Cotton to Yarn



- Cotton fiber, once it has been processed to remove seeds (ginning) and traces of honeydew, protein, vegetable matter, and other impurities (trash), consists of nearly pure cellulose, a natural polymer.
- Cotton production is very efficient, in the sense that ten percent or less of the weight is lost in subsequent processing to convert the raw cotton bolls (seed cases) into pure fiber.
- The cellulose is arranged in a way that gives cotton fibers a high degree of strength, durability, and absorbency.
- Each fiber is made up of twenty to thirty layers of cellulose coiled in a neat series of natural springs. When the cotton boll is opened, the fibers dry into flat, twisted, ribbon-like shapes and become kinked together and interlocked.
- This interlocked form is ideal for spinning into a fine yarn.

Cotton Labor



- Cotton required vast labor forces to hand-pick cotton fibers, and it was not until the 1950s that reliable harvesting machinery was introduced into the South (prior to this, cotton-harvesting machinery had been too clumsy to pick cotton without shredding the fibers).
- During the early twentieth century, employment in the cotton industry fell as machines began to replace laborers, and as the South's rural labor force dwindled during the First and Second World Wars.
- Today, cotton remains a major export of the southern United States, and a majority of the world's annual cotton crop is of the long-staple American variety.

Cotton Q&A



- **Where is cotton grown in the U.S.?**
98% of the cotton is grown in **14 states**: Alabama, Arkansas, **Arizona**, California, Georgia, Louisiana, Mississippi, Missouri, New Mexico, North Carolina, Oklahoma, South Carolina, Tennessee and Texas. The remaining 2 percent is grown in Kansas, Florida and Virginia.
- **What state grows the most cotton?**
Texas, which annually grows about 4.5 million bales of cotton, is the leading cotton-producing state.
- **How many cotton farms are there in the U.S.?**
Cotton is produced on about **35,000 farms in the U.S.**
- **How many acres of cotton are harvested each year in the U.S.?**
In 2000, about 13.1 million acres were harvested, producing an estimated 17.2 million bales.

Cotton Q&A



- **What country grows the most cotton?**
Historically, China is the largest grower . The Chinese produced approximately 20 million bales of cotton in 2000. The U.S. is second, with 17.2 million bales of production in 2000.
- **What percentage of the U.S. cotton crop is exported?**
Over the last five years, 31 percent of the U.S. cotton supply was exported.
- **How much cotton is used by U.S. textile mills?**
Over the last five years, mills consumed an average of 10.8 million bales per year.

Cotton Q&A



- **When is U.S. cotton planted?**
Planting begins as early as Feb. 1 in South Texas and as late as June 1 in northern areas of the Cotton Belt.
- **When is U.S. cotton harvested?**
Harvesting of the crop begins in July in South Texas and extends to late November in more northern climates.
- **What is a boll weevil?**
The boll weevil is the primary insect enemy of cotton. An adult is $\frac{1}{4}$ to $\frac{1}{2}$ inch long, appearing tan to dark brown or gray in color, has a hard humpback-shaped shell and the characteristic snout accounting for about $\frac{1}{4}$ of its length. This pest has plagued U.S. cotton producers since 1892. It can complete an entire lifecycle in three weeks, lay 200 eggs per female—each in a separate cotton square or boll, ensuring the destruction of each—and spread rapidly, covering 40 to 160 miles per year.

Cotton Q&A



- **How is cotton harvested?**

Three mechanical systems are used to harvest cotton. Cotton picking machines use rotating spindles to pick (twist) the seed cotton from the burr. Doffers then remove the seed cotton from the spindles and drop the seed cotton into the conveying system. Cotton stripping machines use rollers equipped with bats and brushes to knock the open bolls from the plants into a conveyor. A third kind of harvester uses a broadcast attachment similar to a grain header on a combine. All harvesting systems use air to elevate the seed cotton into a basket where it is stored until it can be dumped into a boll buggy, trailer or module builder.

- **What is a module?**

Once cotton is harvested, it is stored in modules –which hold 13 to 15 bales–for protection against the weather. Modules are stored in the field or on the gin yard until the cotton is ginned.

Cotton Q&A



- **How much does a bale of cotton weigh?**
A **bale of cotton** weighs about 500 pounds.
- **What is produced from a bale of cotton?**
One bale of cotton can make 1,217 men's T-shirts or 313,600 \$100 bills.
- **How much business revenue does the U.S. cotton crop stimulate?**
In the US in 1997, the cotton industry generated \$40 billion in revenues to various industry segments. Cotton's **value at retail** is estimated at \$120 billion.

What's in a Bale

- **One bale of cotton can make:**
 - 215 Jeans
 - 249 Bed Sheets
 - 409 Men's Sport Shirts
 - 690 Terry Bath Towels
 - 765 Men's Dress Shirts
 - 1,217 Men's T-Shirts
 - 1,256 Pillowcases
 - 2,104 Boxer Shorts
 - 2,419 Men's Briefs
 - 3,085 Diapers
 - 4,321 Mid-Calf Socks
 - 21,960 Women's Handkerchiefs
 - 313,600 \$100 Bills*
- **A bale of cotton weighs about 480 pounds.**



Other Uses for Cotton



- Innumerable commodities are made from cotton. From the lint (the fiber separated from the seed) come the major products, chiefly textile and yarn goods, cordage, automobile-tire cord, and plastic reinforcing.
- The linters (short, cut ends removed from the seed after ginning) are a valuable source of cellulose.
- Cotton hulls are used for fertilizer, fuel, and packing;
- Fiber from the stalk is used for pressed paper and cardboard.

Cottonseed Oil



- Production of the chief byproduct, cottonseed oil, has grown into a separate industry since its establishment in the late 19th cent.
- The oil content of cotton seeds is about 20%.
- After being freed from the linters, the seeds are shelled and then crushed and pressed or treated with solvents to obtain the crude oil.
- In its highly refined state, cottonseed oil is employed as salad and cooking oil, for cosmetics, and especially in the manufacture of margarine and shortenings.
- Paint makers use it to some extent as a semidrying oil.
- Less refined grades are used in the manufacture of soap, candles, detergents, artificial leather, oilcloth, and many other commodities.

BWCDD Cotton



- Grown from March to October
- Watered Once per week for 2 to 3 weeks
- Then every 10 to 14 Days through middle of October
- Typically followed by a Grain

Alfalfa



- **Alfalfa** is a perennial flowering plant cultivated as an important forage crop.
- Alfalfa lives from three to twelve years, depending on variety and climate. It is a cool season perennial legume, sometimes growing to a height of 3+ feet. It resembles clover with clusters of small purple flowers. It also has a deep root system sometimes stretching to 14 feet. This makes it very resilient, especially to droughts.
- Alfalfa is a plant that exhibits autotoxicity, which means that it is difficult for alfalfa seed to grow in existing stands of alfalfa. Therefore, it is recommended that alfalfa fields be rotated with other species (e.g. corn, wheat) before reseeding.
- Like other legumes, its root nodules contain bacteria, with the ability to fix nitrogen, producing a high-protein feed regardless of available nitrogen in the soil. Its nitrogen-fixing abilities (which increases soil nitrogen) and use as animal feed greatly improved agricultural efficiency.

Alfalfa



- It is widely grown throughout the world as forage for cattle, and is most often harvested as hay, but can be made into silage, grazed, or fed as greenchop.
- Alfalfa has the highest feeding value of all common hay crops, being used less frequently as pasture. When grown on soils where it is well-adapted, alfalfa is the highest yielding forage plant.
- Alfalfa is one of the most important legumes used in agriculture. The US is the largest alfalfa producer in the world, but considerable acreage is found in Argentina (primarily grazed), Australia, South Africa, and the Middle East.
- The leading alfalfa growing states (within the U.S.A.) are California, South Dakota, and Wisconsin.

Alfalfa



- The upper Midwestern states account for about 50% of US production, the Northeastern states 10%, and western states 40% of US production, the latter mostly under irrigation. Alfalfa is not very important in the Southeastern states.
- Alfalfa has a wide range of adaptation and can be grown from very cold northern plains to high mountain valleys, from rich temperate agricultural regions to Mediterranean climates and searing hot deserts.
- Its primary use is for dairy production, followed by beef, horses, sheep, and goats, but it is sometimes used for human consumption.
- Alfalfa sprouts are used as a salad ingredient. Tender shoots are eaten in some places as a leaf vegetable. Human consumption of older plant parts is limited primarily by very high fiber content.

Cuttings



- In most climates, alfalfa is cut three to four times a year but is harvested up to 12 times per year in Arizona and Southern California.
- Total yields are typically around 4 tons per acre but yields have been recorded up to 16 tons per acre.
- Yields vary due to region and with weather, and with stage of maturity when cut.
- Early cuttings are often used for green chop due to weed content
- Later cuttings improve yield but reduce nutritional content.

Alfalfa Issues



- Alfalfa is considered an 'insectary' due to the large number of insects which are found there. Some pests can reduce alfalfa yields dramatically, particularly with the second cutting when weather is warmest..
- Alfalfa is also susceptible to root rot.
- A genetically modified variety (Roundup Ready) which is tolerant to the herbicide Roundup has been developed and was sold in the United States from 2005-2007. This enables growers to spray Roundup over the crop, killing weeds, but not harming the crop.
- There were over 300,000 acres planted out of 21 million. In 2007 the USDA put a hold on any further planting of Round up Ready due to a lawsuit.

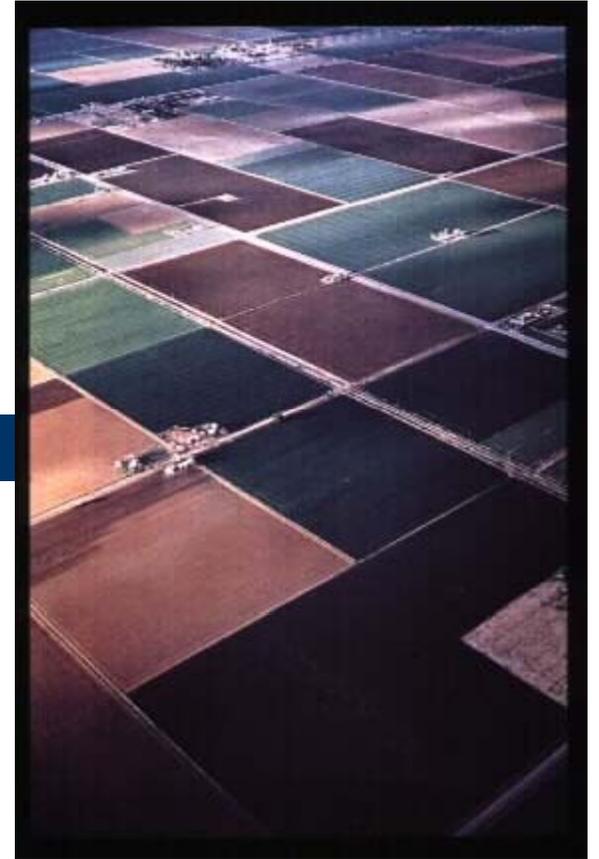
Alfalfa Bales



- When alfalfa is to be used as hay, it is usually cut and baled. Ideally, the hay is cut just as the field is beginning to flower.
- When using farm equipment, the process begins with a swather, which cuts the alfalfa and arranges it in windrows. After it has dried, a tractor pulling a baler collects the hay into bales.
- There are several types of bales commonly used for alfalfa. Small bales are typically about 14 in x 18 in x 38 in and used for small animals and individual horses. The small square bales weigh between 50 – 70 pounds depending on moisture, and can easily be hand separated into "flakes".
- Cattle ranches use large round bales, typically 4 to 6 feet in diameter and weighing up to one half to one ton.
- A more recent innovation is large "square" bales, roughly the same proportions as the small squares, but much larger. The bale size was set so that stacks would fit perfectly on a large flatbed truck. These are more common in western states.

Arizona Alfalfa

- Fall Dormancy is a major characteristic of alfalfa varieties. More 'dormant' varieties have reduced growth in the fall, a response due to low temperatures and reduced day lengths. 'Non-dormant' varieties exhibit winter growth activity, and therefore are grown in long-seasoned environments such as Mexico, Arizona, and Southern California, whereas 'dormant' lines are grown in the Upper Midwest, Canada, and the Northeast. 'Non-dormant' lines are susceptible to winter-kill in cold climates, and have poorer persistence, but can be higher yielding.



Alfalfa in the BWCDD



- Watered every 14 Days in the Winter
- Watered every 7 to 10 Days in the Summer
- Usually follows cotton for nitrogen replacement
- Can be in the field 3 to 5 years

Sorghum / Milo

- **Sorghum** is a genus of numerous species of grasses, some of which are raised for grain and many of which are used as fodder plants either cultivated or as part of pasture. The plants are cultivated in warmer climates worldwide.



Sorghum / Milo Uses



- Numerous *Sorghum* species are used for food (grain, "molasses"), fodder, and the production of alcoholic beverages.
- Most species are drought tolerant and heat tolerant and are especially important in arid regions.
- *Sorghum* is the "fifth most important cereal crop grown in the world". Africans introduced sorghum into the U.S. in the early 17th century.
- Some *Sorghum* such as Johnson Grass are important economic and environmental weeds.
- Some species of *Sorghum* can contain levels of hydrogen cyanide, hordenine and nitrates lethal to grazing animals in the early stages of the plant's growth. Stressed plants, even at later stages of growth, can also contain toxic levels of cyanide.

Other Uses



- Sorghum straw (stem fibres) can also be made into excellent wall board for house building, as well as biodegradable packaging. It does not accumulate static electricity, so it is also being used in packaging materials for sensitive electronic equipment.
- In November 2005, however, the US Congress passed a Renewable Fuels Standard as part of the Energy Policy Act of 2005, with the goal of producing 8 billion gallons of renewable fuel (ethanol) annually by 2012. This bill should noticeably increase the demand for ethanol producing crops for at least the next decade.
- Sorghum produces the same amount of ethanol per unit as corn, therefore in hot areas where sorghum can out-produce corn this bill should result in an increase in grain sorghum cultivation. Sorghum growers are hoping that this will create just the market they need to take off with production.
- Currently, 12% of grain sorghum production in the US is used to make ethanol, and growers are hoping for an increase.

Production

- The FAO reports that 440,000 square kilometres were devoted worldwide to sorghum production in 2004. In the US, sorghum grain is used primarily as a corn substitute for livestock feed because their nutritional values are very similar. Some hybrids commonly grown for feed have been developed to deter birds, and therefore contain a high concentration of tannins and phenolic compounds, which causes the need for additional processing to allow the grain to be digested by cattle.



Sorghum Pros & Cons

- Insect and diseases are not prevalent in sorghum crops. Birds, however, are a major source of yield loss. Hybrids with higher tannin content and growing the crop in large field blocks are solutions used to combat the birds. The crop may also be attacked by corn earworms, aphids, and some Lepidoptera larvae including Turnip Moth.
- It is a very high nitrogen feeding crop. An average hectare producing @ 7 tons of grain yield requires @ 240 lbs of nitrogen, but relatively small amounts of phosphorus and potassium (@ 30lbs each).



Plant Make-up



- Sorghum's growth habit is similar to that of corn, but with more side shoots and a more extensively branched root system. The root system is very fibrous, and can extend to a depth of up to 3.5 feet.
- The plant finds 75% of its water in the top 3 feet of soil, and because of this, in dry areas, the plant's production can be severely affected by the water holding capacity of the soil.
- The plants requires moisture every 10 days in early stages of growth.
- Sorghum's yields are not affected by short periods of drought as severely as other crops such as corn because it develops its seed heads over longer periods of time, and short periods of water stress do not usually have the ability to prevent kernel development.
- Sorghum's ability to thrive with less water than corn may be due to its ability to hold water in its foliage better than maize. Sorghum has a waxy coating on its leaves and stems which helps to keep water in the plant even in intense heat.

Sorghum in the BWCDD



- Watered Once per week for 2 to 3 weeks
- Then every 10 to 14 Days through middle of October