

PEANUT IRRIGATION

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Although considered to be somewhat drought resistant, peanuts exhibit a variation in drought tolerance depending upon the stage of growth and variety. There are critical times during the growth of the peanut plant that a soil moisture deficit can severely limit yields and/or diminish quality. The table below divides the peanut growing season into four stages and indicates the relative response of the plants to a lack of moisture during each stage.

Response of Peanut Plants to Irrigation at Various Growth Stages

Plant Growth Stage (Duration)	Plant Indicators	Relative Drought Susceptibility
germination (1-2 weeks)	planting to emergence	high
early vegetative growth (5-6 weeks)	emergence to flowering/pegging	low
nut development/fruitletting (8-9 weeks)	flowering/pegging to pod formation	high
maturation (5-6 weeks)	pod formation to harvest	moderate

While adequate moisture during the germination stage is necessary for a good, uniform stand, the mid-season nut development, or fruitletting stage, is the most critical time for irrigation if there is a shortage of rainfall. In addition to being the stage in which the peanut plant is most susceptible to drought stress, it is also the stage of maximum water use by the plant.

In Virginia, the critical part of the nut development/fruitletting period includes the latter part of July and the month of August. Irrigation in June or earlier is discouraged, unless extremely dry conditions persist, because excess moisture can trigger excessive vine growth. Irrigation of peanuts in September is also not preferred because too much moisture during the plant maturing stage can increase the severity of CBR, Sclerotinia blight, and leaf-spot diseases. Late unnecessary irrigation can also delay maturity and promote the development of small pods. In dry years, irrigation can reduce the threat of Aflatoxin and suppress the outbreak of spider mites.

Irrigation Scheduling Methods

Soil Feel Method

A soil sample should be taken from several sites, representative of the predominant soil type in the field, by digging down to a 6- to 12-inch depth. To evaluate soil moisture, after the sample is taken, it is held in the palm and fingers of the hand and squeezed to form a ball. Based on the appearance of the ball, the following table can be used to estimate plant-available water. The upper end of the ranges given should be used for coarse-textured soils, such as loamy sands, while medium-textured soils, such as sandy loams, apply to the lower end of the ranges.

Estimating Soil Moisture By The Soil Feel Method

Plant-available Water Remaining In Soil	Feel or Appearance at 6-12 Inches
100%	No free water appears on soil, but wet outline of ball is left on hand
75-100%	Forms a ball that breaks easily
50-75%	Forms a weak ball that falls apart
<50%	Appears dry, will not form a ball
0%	Dry, loose, flows through fingers

In deciding whether to irrigate or not, the plant growth stages described earlier should be considered. For the germination and nut development/fruitlet stages, soil moisture should not be allowed to drop below the 50 percent to 60 percent plant-available water level, while during the early vegetative growth and maturation stages it could be allowed to drop below the 50 percent level. The amount of irrigation water which should be applied once an irrigator has determined the approximate soil moisture content will be discussed below.

Tensiometer Methods

Tensiometers are well-suited to the light, sandy soils found in southeast Virginia. Depending upon the size of the irrigated field and the variability in soil textures, one or more tensiometer stations should be installed. A station consists of 2 tensiometers, 1 inserted to a 12-inch depth and the other at 24 inches. The shallow instrument reflects the need for irrigation while the deep one provides an indication of whether or not irrigation amounts have been adequate. If the deep tensiometer continues to dry during the season while irrigation is continuing, it indicates that insufficient irrigation water is being applied. Manufacturers' recommendations should be closely followed regarding installation and interpretation of tensiometer readings.

The following table relates tensiometer gauge vacuum reading to approximate soil moisture content. In the case of soil tension, readings differ according to soil texture.

Soil Water Availability at Various Tensiometer Readings

Irrigation Trigger Point		Tensiometer Reading (Centibars)	
Peanut Plant Growth Stage	Plant-available Water Remaining in Soil (%)	Sandy loam	Loamy sand
germination	60	40	20
early veg. growth	40	60	40
nut devel./fruiting	60	40	20
maturation	40	60	40

Electrical Resistance Methods

A gypsum soil block is an “electrical resistance” device which uses gypsum as a porous material in which electrodes are embedded. Electrical resistance between the electrodes varies with soil water content. Gypsum has a characteristic much like a very heavy clay with small pores. Gypsum blocks, therefore, are not recommended for the light, sandy soils of southeast Virginia.

Another electrical resistance type sensor that has been developed in recent years is called the Watermark sensor. As with the gypsum block, the sensor’s resistance varies with the electrical conductivity of solution between the electrodes. Pore sizes in this matrix are larger than those of the gypsum block, thereby making it more suitable for coarse-textured soils. Unlike gypsum blocks, Watermark sensors may be reused year after year.

Watermark sensors (and gypsum blocks) come with a meter that is attached to the terminals. Some meters give an instant reading of soil water tension while others provide a digital readout which can be converted to tension using a simple chart. Irrigation should occur when sensor readings exceed a set tension level as with tensiometers. Follow manufacturer’s recommendations carefully when using this method.

How Much Irrigation?

In peanut irrigation, it may be advisable to bring soil moisture back up to only 85 percent to 90 percent of plant available water-holding capacity in the event that rainfall occurs shortly thereafter. This will allow the soil to accommodate part of the rainfall and may help to reduce associated disease incidence.

The amount of water to apply depends on soil texture, root zone depth, and the plant-available water level when irrigation is begun as well as the sprinkler irrigation efficiency. The following table provides irrigation estimates considering these factors for two soil textures.

Maximum Water Application at Various Growth Stages, Soil Moisture Levels, and Soil Textures

Peanut Plant Growth Stage	Plant-available Water Remaining in Soil (%)	Maximum Amount of Irrigation Water to Apply (Inches)	
		Sandy Loam	Loamy Sand
germination	60	0.33-0.50	0.25-0.33
early veg. growth	40	2.00-2.25	1.25-1.50
nut devel./fruiting	60	1.25-1.50	0.75-1.00
maturation	40	2.00-2.25	1.25-1.50

To determine if these applications are adequate, an irrigator can evaluate the deep tensiometer readings or examine deep soil samples by the soil feel method.