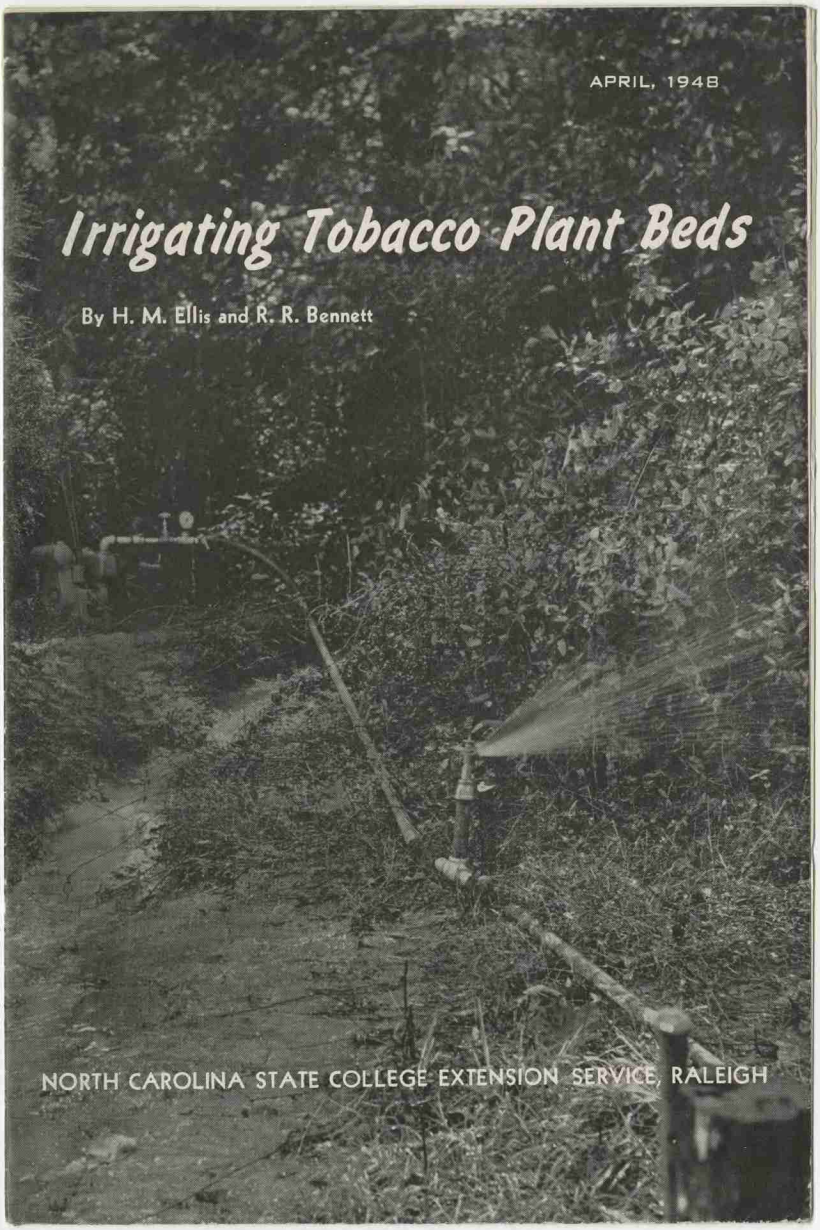
APRIL, 1948
Irrigating Tobacco Plant Beds
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Diagram of Complete System

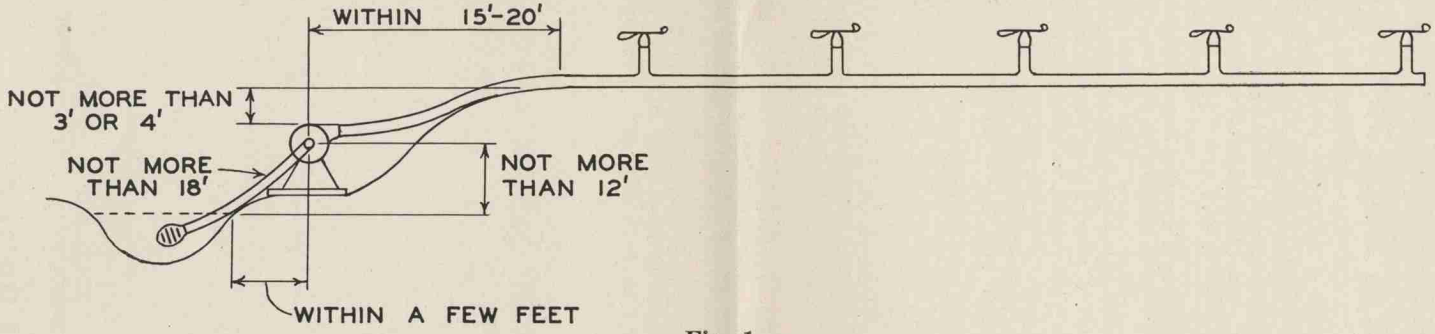


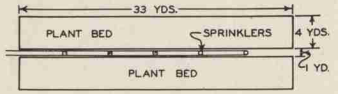
Fig. 1

PERFORMANCE TABLE FOR LOW PRESSURE SPRINKLER

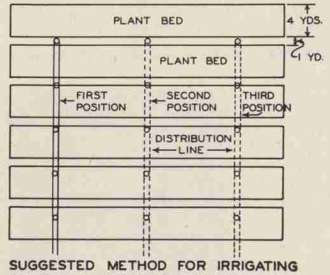
(FROM MFGS. CATALOGUE)

POUNDS PRESSURE	3/16" NOZZLE		1/4" NOZZLE	
	DIAMETER OF CIRCLE COVERED FEET	SPRINKLER DISCHARGE GALLONS PER MINUTE	DIAMETER OF CIRCLE COVERED FEET	SPRINKLER DISCHARGE GALLONS PER MINUTE
3	19	1.71	21	295
4	24	1.99	26	3.42
5	28	2.24	30	3.82
6	31	2.46	33	4.20
8	34	2.83	36	4.74
10	36	3.15	39	5.19
12	39	3.47	42	5.62
15	42	3.91	45	6.36

Fig. 2



SPRINKLER LINE PLACED TO IRRIGATE TWO BEDS AT ONE TIME



SUGGESTED METHOD FOR IRRIGATING SEVERAL BEDS IN ONE LOCATION. DISTRIBUTION LINE COULD BE PLACED IN ALLEYS.

Fig. 3

Irrigation Is Needed

The shortage of tobacco plants at planting time on many North Carolina farms proves that there is need for improvement in plant bed management. Many times the farmer finds that lack of rainfall, or of a convenient method of irrigating plant beds is a limiting factor in rate of plant growth.

A heaping tablespoonful of seeds for 100 square yards sometimes does not give a sufficient stand if the soil is dry and crusty at seed germination time. This has brought about the practice of using two or three times this amount of seed, which produces stands that are too thick if the moisture conditions are favorable.

High, dry pine ridges commonly used in some sections of the state cannot be recommended as suitable plant bed locations. Growers are urged to select the better, fertile loams and moist soils, usually found along streams, ditches, or in low places near farm pond sites. Avoid extremely wet and cold locations as adequate surface drainage is essential.

Irrigation does not promise to eliminate all problems. As a matter of fact, care must be used to see that the plants are watered just before time to spray or dust for blue mold, otherwise, the blue mold control program may be weakened. It is true that when the weather is hot and dry enough to require much watering, blue mold is usually quite inactive.

When To Water Beds

Proper irrigation of plant beds is very important when seed are germinating and as it is needed throughout the plant growing season. Water the beds when the soil is too dry for optimum plant growth. Light, frequent watering when the seed are sprouting (about $\frac{1}{4}$ inch) is preferable to heavier watering, which would tend to pack the soil.

Should too much water be used at a time, before the seedlings are established, surface movement of water may disturb, or "puddle," the germinating seed. A light mulch of wheat straw, pine straw, or well-rotted sawdust will be worth a great deal in breaking the impact of water, in reducing surface movement and in conserving moisture.

During plant growth fairly heavy watering twice a week and just before each blue mold treatment is desirable. At this time it will usually require from $\frac{1}{2}$ inch to 1 inch of water to sufficiently wet the soil—280 to 550 gallons of water for 100 square yards. Be careful to prevent surface runoff when the soil is crusty, or when the bed is on a slope.

Water just before drawing plants so that the plant can be pulled up easily, and with a good root system. Water the bed again immediately after pulling plants so that the remaining plants will straighten up and recover quickly for the next drawing.

With this system, the maximum acreage can be planted in a short-time from a small plant bed area.

Locating Water Supply

The water supply should be given careful consideration. Ordinary sources of water are: Continuously flowing streams, natural or artificial lakes or ponds, open dug well, and shallow driven or drilled wells, which will supply sufficient water, within 15 feet of the ground's surface.

Shallow, open wells may be blasted along the edges of swamps. Ditches may be blasted to carry water from a stream or a swamp to the edge of cultivated fields. Artesian wells are sometimes used.

As a last resort it may be necessary to haul water in barrels or in an improvised tank wagon to the pump location.

In all cases the tobacco grower should satisfy himself that the water he is to use **does not flow off an area already infested with tobacco diseases.** A farmer should be careful about using water from a stream that does not have its origin on his own farm.

How To Apply Water

Tobacco plant beds are being successfully irrigated in North Carolina and elsewhere by revolving sprinklers. Water is applied over the entire bed through sprinklers especially designed to uniformly cover a given area. It is generally accepted that this is the proper way to water tobacco plants in the bed.

There is such a variety of conditions, such as distance of bed from water supply, elevation above water supply, slope of bed, and size and shape of bed, that it is practically impossible to make definite recommendations for an irrigation system without having information about exact conditions. The quantity of available water and the necessary lift of the water may completely alter the recommendations as to the pump that should be used.

Admitting the complexity of the problem, an attempt will be made to give enough information to cover the two most common conditions so that a tobacco grower can buy and assemble a fairly inexpensive portable irrigation system to use. Recognizing that the system will very likely be used for a short period each year, it is desirable to keep the cost to a minimum.

Two Conditions Which Govern System Needed

Condition No. 1

1. Assuming that there is an open supply of water (it may be a pond, stream or other similar source).
2. When the pumps can be located not more than 12 feet elevation above the surface of the water supply. (Less than 12' elevation is desirable).
3. Where the pump can be located within a few feet distance of the water supply.
4. Where the suction line can be not more than 18' long (insofar as possible).
5. Where the plant bed site is within 15-20 feet of the pump and not more than 3 or 4 feet higher than the pump.

The conditions above require a simple set-up that will irrigate a large number of North Carolina plant beds and will permit the use of a simple and economical system.

A pump size $1\frac{1}{2}$ inch discharge, open or closed, impeller centrifugal pump which retails for $25 to $55 will do the job outlined in condition 1.

Condition No. 2

1. Where the water supply is from an open well, pond, stream or pumped from driven points.
2. Where the suction lift (elevation between water and pump) is more than 12 ft. and not to exceed 22 ft.
3. Where it is necessary to locate the pump 25 ft. or more from the water supply.
4. Where the suction line has to be more than 18 ft. long.
5. Where the plant bed is a considerable distance from the pump or where the elevation of the plant bed is a good many feet higher than the pump.

A pump capable of delivering more pressure than is required in condition 1 is necessary for job outlined in condition 2.

There are a number of pumps available that will perform this service such as the Goram-Rupp, $1\frac{1}{2}$ inch pump, model 1103, the $1\frac{1}{2}$ inch Marlow Self-Priming pump, and similar pumps made by other manufacturers. These pumps, with motor, retail for $140 and up.

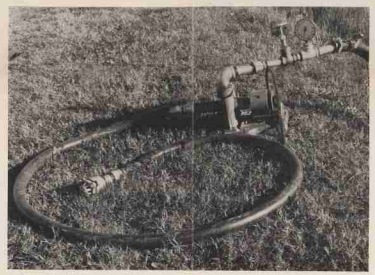


Fig. 4

An attempt has been made to recommend a unit, see Figure 4, which can be powered with the farm tractor, or other gasoline engine that is rated $1\frac{1}{2}$ h. p. or more, and that is already available on the farm. The system described above has been set up and when driven by a $1\frac{1}{2}$ h. p. engine, turning at 2,000 r.p.m., an area 33 yards long, 8 yards wide at upper end and 10 yards wide at end nearest the pump was covered by the sprinklers. The width of the wetted area within reasonable limits can be controlled by the speed of the tractor. These pumps should not be operated faster than approximately 2,000 r.p.m., without checking manufacturer's recommendations.

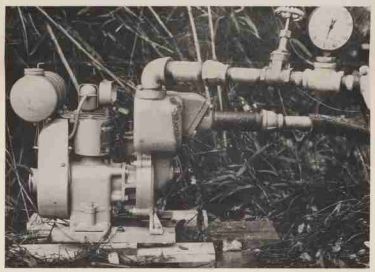
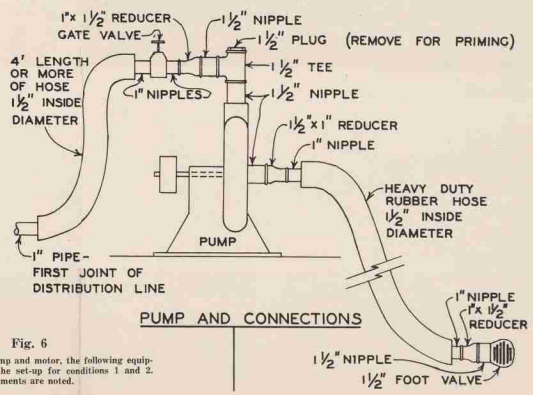


Fig. 5

They are desirable where there is no available source of power such as a farm tractor. The suction and discharge lines can be made up exactly the same as for the system described in Condition 1. The priming tie and foot valve are not absolutely essential for the type pump shown in Figure 5 but are recommended as a time saving convenience. The low pressure sprinkler recommended in Condition 1, or regular 20-pound pressure small volume sprinklers, can be used with these type pumps. The regular sprinklers will wet a larger area, but there is the disadvantage of the packing action of larger drops of water that are thrown out unless sprinklers are equipped with diffuser pins.



PUMP AND CONNECTIONS

Fig. 6

In addition to the pump and motor, the following equipment will complete the set-up for conditions 1 and 2. Differences in requirements are noted.

EQUIPMENT REQUIRED FOR SUCTION LINE:

1-1½x6" nipple (Connects to pump. May vary in size with different pumps).
1-1½x1" reducer, 1-1x4" nipple.
1-pc.-18' heavy rubber hose, inside diameter 1½" (A 1½" pipe may be connected to pump with nipple and elbow instead of rubber hose.)
To connect foot valve to hose, use; 1-1x1" nipple, 1-1x1½" reducer, 1-1½x2" nipple, 1-1½" foot valve (Essential for pump described in Condition 1. A spring loaded foot valve should be used). If 1½" pipe is used instead of hose, foot valve may be connected to end of pipe.

EQUIPMENT REQUIRED FOR DISTRIBUTION LINE:

1-1½" all-thread nipple
1-1½" tee (Necessary for convenience in priming pump)
1-1½" plug (Removed for priming pump)
1-1½"x2" nipple
1-1½x1" reducer 1-1x4" nipple
1-1" gate valve 1-1x4" nipple
1 pc. of hose (same as above) 4' or longer
5 pcs. 1" pipe, preferable 18' length (ends need not be threaded).

DETAIL OF THE SPRINKLER ASSEMBLY

Fig. 7

9 pcs. $1\frac{1}{2}$" hose (inside diam.), 8' long to connect pipe (This will make system flexible and enable one man to install system.)

9-1x4" nipples

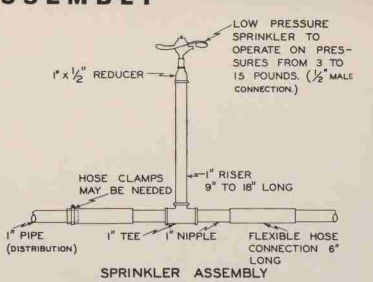
5-1" tees

1-1" pipe plug for end tee (removed from flushing pipe line.)

5-1" nipples (These are sprinkler risers and will be from 9" to 18" long depending on whether pipe line is level with plant bed surface, or in a trench between beds.)

5-1" to $\frac{1}{2}$" reducers

5-Low pressure sprinklers with $\frac{1}{4}$" or 3/16" nozzles. These will have to operate on pressures varying from 3 to 15 pounds, and must be designed for these pressures. The No. 20, low pressure, rain bird sprinkler made by the L. R. Nelson Mfg. Co., is at present the only low pressure sprinkler available that we know of. There may be others.



SPRINKLER ASSEMBLY

Fig. 8