

COMPARING LAND LEVELING METHODS FOR ALFALFA

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Because of the large amount of water used for irrigation and the demand for water throughout the state, increasing pressure is being applied for agriculture to use less water and use it more efficiently. This can only be accomplished if we know exactly what the plant requirements are, which Joe Lord will elaborate on a little later this morning, and we are able to control water usage evenly throughout the entire field. It doesn't do any good to know the plant requirements if you don't have the system to control the water.

In my opinion, this can be carried out by three methods: Sprinklers, Drip System, and precision flood irrigation. Each has its own advantages and disadvantages, but I would like to rule out the first two, for alfalfa, because of their cost of installation, labor requirements, and energy efficiency.

In order to obtain our objective of precision flood irrigation, there are several factors which need to be considered, whether it be a virgin piece of property or one which has been farmed for a number of years. The type of soil, existing contour or grade, and the amount of water available are the main factors in determining the end fall or percent slope necessary for precision irrigation of alfalfa. Is the soil sandy, whereby it dries out rapidly and requires more frequent irrigations or is it a heavy clay material which retains its moisture? Is the existing grade or natural slope such that large amounts of soil will have to be moved? Making heavy cuts can cause lost or reduced production for a year or two and require the use of expensive soil amendments. Is there a large quantity of water available, such as a canal outlet or do you have to depend on low production wells? Most of the fields in this area, which are to be planted to alfalfa, are leveled with an end fall or direction of irrigation slope of $1\frac{1}{2}$ to 2 tenths per 100 feet. With this amount of slope it enables you to get the water across the field more rapidly and provides for good drainage. I have found that if you have too much fall or slope it is impossible to put enough deep moisture into the ground without excessive tailwater and likewise if the field is too flat you will have more problems with water standing and phytophthora root rot.

Another major factor is the financing available. With the high cost and scarcity of money today, one would have to determine if the cost of the project can be offset in the immediate future by increased yield, or savings in water and labor costs. In other words, cost versus effect. It is not uncommon to see 10 per cent of an alfalfa crop flooded out and taken over by weeds in a poorly leveled field. The lost production from this acreage over the three or four year life of the alfalfa crop can amount to over \$200.00 per acre. This, coupled with added expenses for weed control, additional water usage and a poorer quality of hay in the bale can easily justify the cost of precision leveling.

Once the initial leveling is completed, it is necessary to prepare the soil for planting. This is where a lot of irregularities in the surface occur. Through the process of subsoiling or ripping, discing, and harrowing there is a certain amount of soil which is carried by the implements and either deposited on the ends of the field or left in ridges or furrows. This, combined with the process of building the borders with motor graders, homemade crowdors, or commercially built border makers like the Yonkers and Johnson, the field sometimes becomes more irregular than prior to leveling. All of these implements tend to leave the alfalfa check lower next to the border. When it comes time to irrigate, the water either runs down the sides of the checks or blocks have to be shoveled to control the water. For those of you who are farmers, there is nothing that upsets a swather or baler operator more than when he drives down an alfalfa check and runs into one of those blocks with a big hole behind it. Many methods are used to help correct this problem. A disc will help move some dirt toward the border, even though it leaves ridges and furrows. A float or tri-plane helps to remove the small irregularities but still isn't the solution.

Our answer to this problem is to do just a rough leveling job, if needed, prior to land preparation and border construction, and to laser level between the borders just prior to planting. The laser system consists of a transmitter, a receiving unit mounted on the scraper and a control panel inside the tractor. The laser beam is transmitted from a rotating command post, run by an electric motor, which is set on a tripod in the field. The ruby crystal laser is a vertical beam of concentrated light, bent at a 90 degree angle by a rotating prism.

The transmitter generates a plane of light on the level or at a predetermined grade, that can be used up to 1,000 feet in any direction, and the motor is run by a 12-volt battery.

After the initial field survey is completed and the desired slope is selected, the laser is set at the proper grade. This is accomplished by dialing the figures into the transmitter unit and the laser then sends this message to the receiver.

The receiver is composed of silicone photocells and is mounted on a mast attached to the scraper, or bucket. As the laser continually strikes the receiver, the signals are transmitted to the hydraulic system on the scraper.

The scraper elevation is matched to the reference from the laser five to ten times every second and automatically adjusts itself to the slope or grade desired. With this automatic control system it also enables the farmer or contractor to use an operator with less experience.

There are several types of scrapers which can be adapted to the laser system. The most common are drag scrapers pulled by either two or four wheel drive tractors and Reynold scrapers which have a larger capacity and an apron which enables them to transport the dirt.

After the checks have been leveled with the laser, the only preparation for planting that is needed is a little drag scraper work on the ends. It is a good practice to also loosen up the ground with either a cook chisel or "Big Ed" type chisel prior to planting.

If you are going to plant a semi-permanent crop, such as alfalfa, you should do your very best in preparing the land.

I feel that by using this method of laser leveling between the borders, you will be able to establish a better stand of alfalfa with less crop loss due to standing water or dry spots, less weed control expense, a reduction in labor costs and a higher quality of hay.