Introducing leveling laser and its application in agriculture

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The use of laser land leveling and, especially large land As well as land leveling steep slopes in one direction and would be effective in either direction But the issue here should be considered, an economic evaluation of the system Using laser leveling on the one hand, the initial purchase cost of laser equipment to farmers imposes But on the other hand, shortening the time for leveling, precise leveling, which increases the quality and quantity of crop. To reduce the amount of water needed for irrigation and consequently the costs of pumping and Cost savings and income in agriculture ... he adds. The costs, savings and earnings due to weather conditions, terrain and different economies in different countries will vary. The product of these parameters will depend on the cultivated land by leveling. Considering these facts, it is clear that for each crop (wheat, rice, etc.) Return individually been investigated and appropriate laser system is selected. Keywords: leveling now, laser, terrain, slope

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INTRODUCTION

Surface roughness important impact on the growth, strength and fruiting product The effect of soil moisture distribution patterns and interactions of water with the salt makes .land leveling, a major factor in agricultural management, soil and crop. Conservation technologies are leveling the land would be better. Therefore, farmers are especially important to the operation of flat land However, traditional methods of leveling, in addition to being cumbersome and time-consuming, cost methods are also. The traditional irrigation methods, the amount of water farmer’s use In addition to being wet all parts of the earth’s surface covered with a layer of water. Studies indicate that substantial amounts of water due to improper land and its rugged design is wasted The problem of lands which harvested area used for rice, Is more acute for example, the height difference between the highest and the lowest point harvested area a rice field in Asia, the average is 160. This means that in a terrain with 80 to 100 mm of water should be stored the entire surface is covered with water. This equates to 10% of the total amount of water that is necessary for the growth of the rice crop [1].

Different methods of land leveling:
Wagon animals, such as cattle and buffalo Taylor and tractor can be used as a power source for land leveling operations. The complete resource leveling, ground conditions and needs are different. Animals used for leveling and Tyler must have moist soil and watered the whole surface of the earth is covered with water. Usually a leveling one Hectares of land by animals 12 days and Tyler 7 to 8 days is required.

land leveling using tractors and equipment attached to it:
Usually using of a tractor for land leveling start leveling blade (Blade) and Drag Bucket is used. Both tractors leveling the land (dry and wet) are effective

A- Tractor blade + leveler (available in a range of 0 to 5/0 ha): Smoothly blades which can be used in both wet and dry soils used If the ground is dry, the blades on the ends of their two wings should be (To prevent the escape of dust from the sides) and equipped with depth control wheel at one end be Soil removal operations must be set At each stage of cm30-25 soil is not removed.. If soil is moist, not the wings on both sides of the blade and the depth control wheel can be used. Usually, the blades are installed in the rear wheel, the front wheel can be installed, but if it can only be used on dry land In this case, the operator must have a lot of experience [2, 5, 7].

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B- Leveler, tractor + box (available in a range of 0/12 ha):

Boxes leveler Very efficiently and is faster than other blades are flat. One of the most important issues when using the flat box, select the appropriate power of the tractor. Therefore, the computation

C. Laser leveler+ tractor blade or box (available in the range > 1. / Ha):

Box blade flat on the laser system can be installed, so that the height control automatically done Capacity depends on the size, shape, moisture, and soil type and operator skill.

The use of laser land leveling in countries like the U.S., Japan and Australia are quite common and recent events in the country is increasing the use of laser land leveling process which has many advantages such as the following can be mentioned.

Benefits of Laser:

- Smooth and flat surface
- Reduced water for irrigation
- reduce costs in the long run leveling
- more uniform distribution of water on Earth
- More uniform moisture environment for product
- Growth and development of more uniform product
- Reduce the amount of seed, fertilizer, pesticide and fuel
- Reduce irrigation costs (pumping costs)

However, this system has limitations, including the following can be pointed

- Price of Laser Equipment
- the need for a skilled operator to set up and adjust the laser equipment and also use its

This system is standard size and shape of the land, is more effective [3, 6, 8].

Function of leveler Laser performance:

Laser leveling system requires a laser transmitter, a laser receiver is mounted on the flat box And an electrical control circuit is a hydraulic valve Solenoid Laser transmitter in a corner of the earth can be installed vertically on a tip. The generating its central axis perpendicular to the beam direction is horizontal, High-speed turns. Radiation emitted by rotating around the axis parallel to the horizontal plane makes. If on land leveling tool, the receiver is installed the high point of the tool function the height of the transmitter is already set, compare May be appropriate command to increase or decrease the tool ordered. If necessary, a sloping surface is leveling, just the axis around which the rotation of the laser generator can be adjusted to angled with this, the page was created by the beam angle to the horizon, and consequently the surface is parallel to the flat plate

Components laser leveling system:

1- Tractor:

Leveling tool can be used for pulling the 4WD and 2WD tractors used Due to time constraints and
dimensions land, power requirements between 30 and 500 hp tractor range.

2- Leveling tool:

Leveling tool can be a simple tool that only to the extent that it is stored in the front and Soil moves. On the other hand, this tool can be used by a relatively complex has a Soil tank in the high ground and soil scraped and
stored on it in the low point of land.

3- Laser transmitter:

The transmitter is usually mounted on a tripod as mentioned previously, the sender, has produced a rotating beam creates a working space of the base level. It has an operating range depends on the transmitter, but usually are designed for distances 300 meters Because the distance is considerable error due to curvature of Earth, So that the height sensed by the receiver will be underestimated.

4 - Laser receiver:

Laser receiver, a set of sensors that are installed vertically While the middle of the sensor to receive radiation, This indicates that the land is located at the position Sets the desired height And if the sensors detect radiation to the upper or lower Signal is sent to the control and signal after processing The command for opening or closing the hydraulic valve and the opening and closing hydraulic cylinder Up or down to cutting edge leveling tool is issued.

5 - Control:

The function of the laser signal receiver, processing it and then send the command to the valve Hydraulics is responsible the current position of the tool the desired position relative to smooth surfaces shown And gives the operator the possibility to detect the number of went back steps

6- Hydraulic system:
Hydraulic system and pump components, valve pressure, the valve Solenoid servers, Jack and fittings are included. Usually the tractor hydraulic pump, oil pump for raising and lowering the leveling tool is used. Since positive displacement pump and a hydraulic pump tractor is always more than the required amount of oil pumps, Reduces pressure valve (Relief Valve) circuit is essential to not harm the pump [9, 10, 11].

Laser-assisted land leveling steps:
1 - Plowing:
2 - Mapping:
3 - Leveling:

REFERENCES