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BLADE CULTIVATORS THEIR OPERATION AND ADJUSTMENT

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BLADE CULTIVATORS, THEIR OPERATION AND ADJUSTMENT

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The realization of the need for a new type of implement for Western Canada that would till the soil without burying the stubble, has brought about the introduction of blade cultivators. These implements were first introduced in areas where soil drifting is a constant threat because stubble mulch is recognized as an effective method in the control of wind and water erosion. In other areas farmers are finding that this type of implement can be used to advantage. Such machines have been in use since the thirties but it was not until the last five years that they have taken a recognized place in tillage operations. Recent improvement in design and greater numbers of machines available on the market, have helped to increase the interest in these implements.

The tillage action of the blade cultivator is very similar to that of a standard cultivator shovel. *See* figure 1. This being the case, soil conditions which limit the effective operation of the standard cultivator also apply to blade cultivators. In heavy clays their use is limited to the drier seasons because of the poor scouring action of these soils when wet. The lack of soil resistance for good shearing action is a problem in light sandy soils. However, new blade designs are gradually overcoming some of these difficulties, especially for the lighter soils. In areas of abundant soil moisture it has been found that the tillage action of blade cultivators is not severe enough for good weed kill. To date, blade cultivators have been used with the best results in areas of medium soils and in the more arid regions.

Adjustment of the Blade Cultivator

The blade cultivator is a simple looking tillage implement, and one that would appear to be easy to adjust and operate. However, its apparent simplicity has led to many discouraging failures because insufficient attention has been given to the correct adjustments and to the soil conditions. If this type of equipment is properly adjusted a satisfactory operation may be performed.

Hitching to a blade cultivator and beginning operations without first giving a thought to its adjustment and operation, may result in ineffective tillage. Timeliness of tillage operations is very important with blade cultivators if good results are to be expected.

Figure 1. Showing action of a blade cultivator.

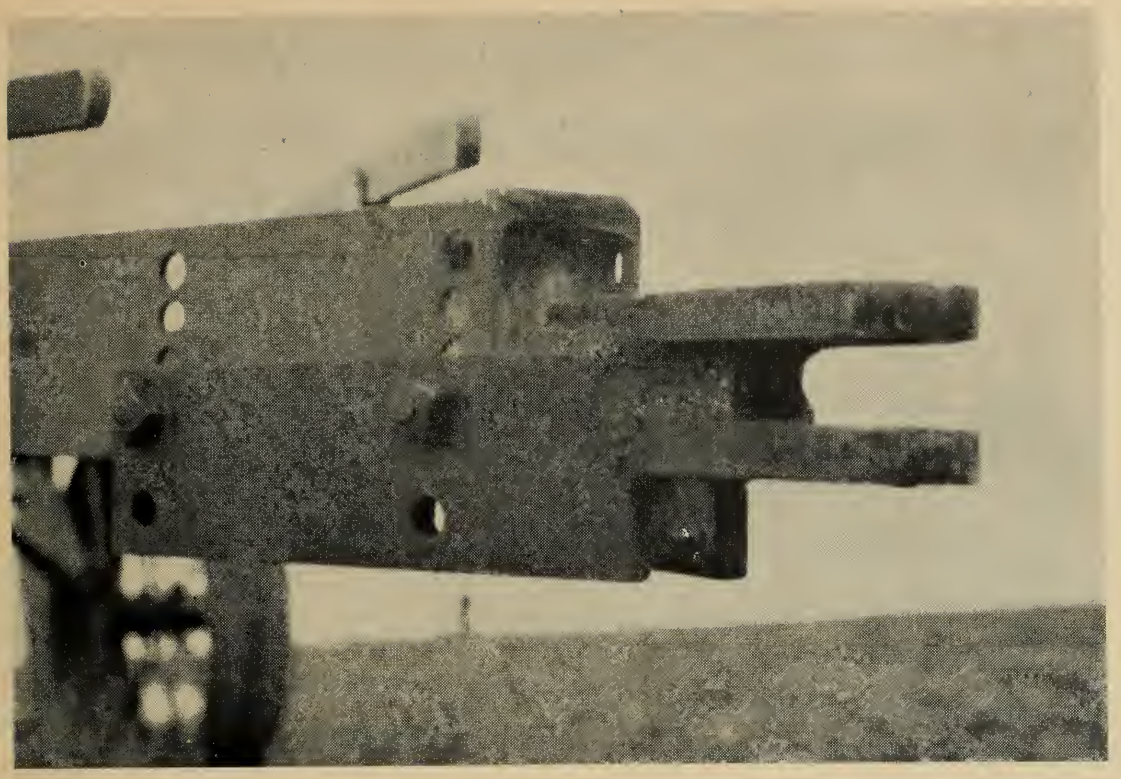


Figure 2. Shows an adjustable hitch.

All adjustments found on the blade cultivator are basically for two purposes:

1. To adjust the cutting edge so it will be level at the working depths.
2. To set the working depth.

Cutting Edge Adjustment

The adjustments, which control the setting of the cutting edge, level or tilt the blade in the direction of travel, and at right angles to the direction of travel.

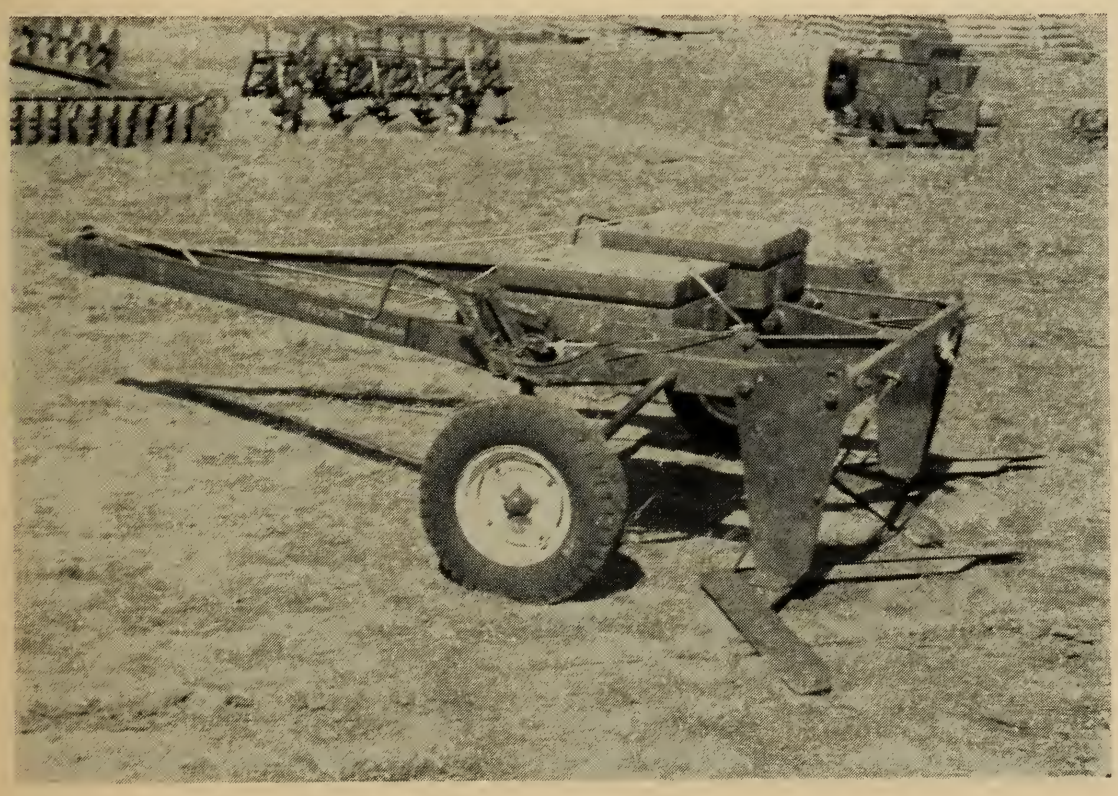


Figure 3. Shows adjustable standards and the adjustable brace rods. The trash rods can be seen on the standards. Note also the weight blocks and their placement.

On some machines the first of these two adjustments can be done by altering the height of the hitch. Figure 2 shows this type of adjustment. On other machines this levelling is obtained by tilting supporting standards. This adjustment is similar to that used on a cultivator shank. The standards are attached to the main frame by bolts. A slotted hole in the standard allows it to be pivoted for this adjustment. A set screw locks the standard in the desired position. This method is shown in figure 3.

Generally, the standards are braced from the sides by adjustable rods. These rods provide for the level adjustment at right angles to the direction of travel. They also serve to hold the standards rigid during operation. These may be seen in figures 3 and 6. Some single V-shaped blade machines do not require brace rods as the blade is supported rigidly by three standards.

Adjustment for the Straight Blade Cultivator

The straight blade cultivator is the most easily adjusted. The blade pitch on this machine can be readily changed. The pitch should be such that the frog will just clear the ground while in operation. If the pitch is too flat, wear will occur on the frog. On the other hand, too steep a pitch, while increasing suction to a point, will greatly increase the draft. This adjustment can be made on the hitch, if adjustable, or by adjusting the standards by means of the slotted bolt hole and set screw arrangement. As a straight blade has two supporting standards, it is always in correct level adjustment at right angles to the direction of travel.

Adjustment for a V-Blade Cultivator

On the V-type blades the pitch is fixed. There is only one correct adjustment for a set depth of operation. The cutting edge of the blade must run level while in cut, and have the same operating depth for all points on the blade. Tilting the nose down will lift the wings, which may cause them to come out of the ground and become trash bound. Deeper depth of operation is then required in order that the wings will operate properly. This greatly increases the draft.

Those machines which are adjusted at the hitch should not cause too much trouble. Those which are adjusted at the standards are more difficult to set. This is especially true if the implement has more than one V-shaped blade. Depth

Figure 4. Method of checking points on the blade for depth of operation.

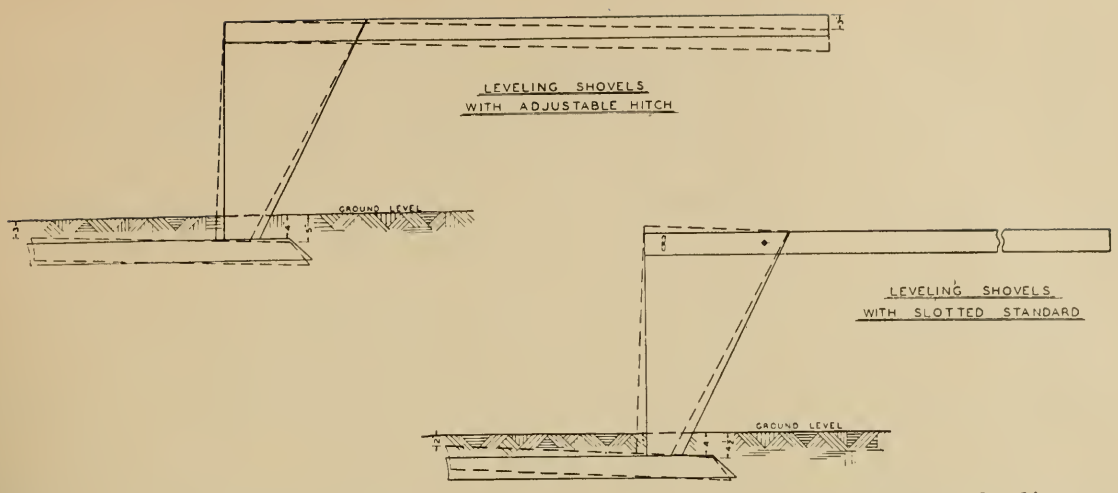


Figure 5. Levelling V shovels in the direction of travel. Solid lines show good adjustment.

of operation at all points of the blade is first checked as in figure 4. The hitch or standard is then adjusted to obtain the same depth of operation at the points and wings.

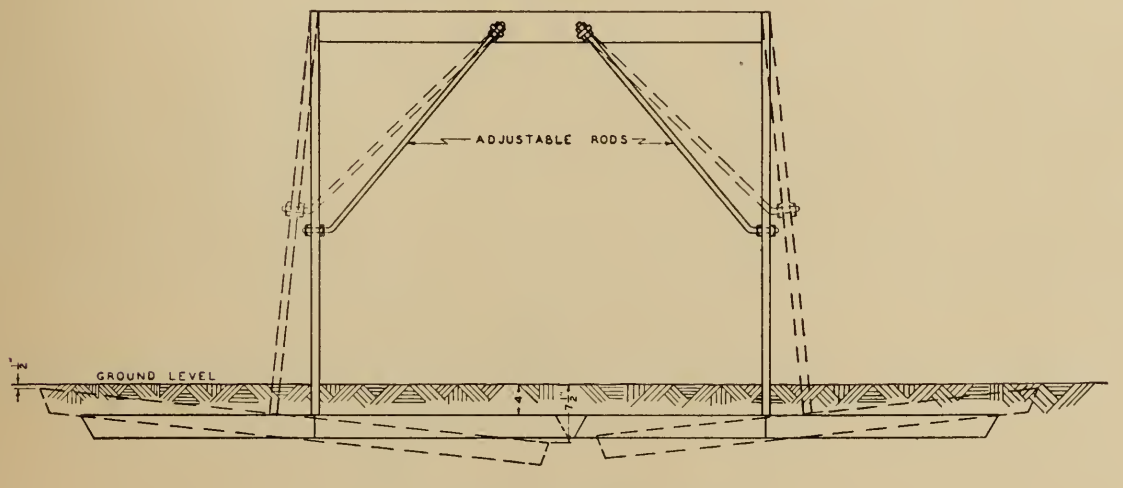
The brace rods are used to level the blade or blades at right angles to the direction of travel. For machines with more than one V blade, a string stretched on the underside of the blades at the end of the wings can be used. When the string just touches all wings, this adjustment is correct. *See* figures 5 and 6.

Once the implement has been correctly adjusted to run level, checking is required only at intervals. But if the implement is to be used on another tractor, unless the tractor has the same drawbar height, the blade will require readjustment. This is important to remember. The wear on V blades is a good indication of the adjustment. The importance of running V-shaped blade level can not be over-stressed.

Depth Adjustment

The depth adjustments found on these machines generally are incorporated in the lifting mechanism. The types of lifts used include:

1. Levers
2. Mechanical power lifts
3. Hydraulic lifts:
   (*a*) power driven pumps
   (*b*) hand operated pumps
4. Hand operated screw lifts



LEVELING "V" SHOVELS BY
USE OF ADJUSTABLE RODS

Figure 6. Levelling the V shovels at right angles to the direction of travel. Solid lines show the desired adjustments.

Working Depths

Operating at a depth from 2 to 4 inches is desirable from the standpoint of weed kill and draft. Since the weeds are left standing, the tillage operation must be shallow to insure sufficient disturbance of the soil around the roots of the weeds for a good kill. The draft increases quickly with the depth of tillage and consequently deep tillage means higher cost. Later operations are more easily carried out if shallow operations are practised.

Working in stubble requires a depth just deep enough to pass under the crown of the roots of the grain crop. Summerfallow operations are best at 3 to 4 inches. Breaking of sod can be done at 2 to 3 inches or less, but rough fields will require a greater depth. On rough fields and on fields not previously worked by a blade cultivator, several operations may be required at a deeper depth until the field becomes smoothed out.

Finding the Depth of Operation

Once the blade has been correctly adjusted the depth of operation can be obtained. A good practice is to set the machine deep at first. This will prevent any possibility of the machine running on top and piling up trash. Depth is gradually decreased until the minimum depth is reached where the blade will function properly.

Use of Weights

When difficulties are encountered in obtaining penetration with blade cultivators, generally the addition of weight will overcome this trouble. The amount required may vary from very little to as much as 150 to 200 pounds per foot width of cut. The addition of weight will often make it possible to maintain a shallower and more even depth of operation. The addition of weight often increases the draft in that the blade will maintain its depth while cutting through hard spots. For summerfallow conditions some types of blade cultivators will not require any weight, while others may need added weights for all operations.

Choice of Weights

Weights can be of any type. This may include rock, old tractor wheels, scrap iron, or a box containing weight. A good set of weights can be made of concrete blocks incased in strap iron frames. Four weights on each machine keep the blocks down to a size which can be handled by two men. The strap iron frames should be made to fit neatly on the implement so they can be easily attached to the frame. Figure 3 shows weight box frames and how they are attached to the implement. The arrangement of the weights, approximately over the wheels if possible, will help to make the machine easier to hitch.

Speed of Operation

For good weed kill and all round performance, high speeds up to 4 to 6 miles per hour are recommended. The high speeds ensure that the soil is broken away from the weeds without unduly increasing pulverization of the soil particles. Speed does not materially affect the conservation of the trash by a blade cultivator. The construction of most machines is such that they will withstand the strain of high speed operations. Many of the machines have a shear pin in the hitch or a shear bolt in the standard as a safety device.

Weeder Attachments

Once the ground has been worked or is in a loose condition, V weeder attachments may be used. *See* figure 7 for illustration.

These weeder attachments are not obtainable for all types of blade cultivators. The weeder attachment offers the following advantages:

1. Greater agitation of the soil and so a more effective weed kill.
2. Increased coverage because the weeders take advantage of the reduced draft in loose soil by cutting an extra two or three feet.
3. A superior operation in loose soil than the straight or V shovel.

Operating Hints

1. Cultivate on hot dry days. This is especially important when moisture conditions are good and weeds are growing rapidly. Therefore, operations should be started as soon as the blade will function properly after a rain. This may be as early as would be the case with a one-way disk.

2. Cultivate when the weeds are small. Not only will this conserve moisture, but the weeds are easier to kill.

3. Cultivate at fairly high speeds. Speeds of 4 to 6 miles per hour are recommended. The higher speeds help to loosen the roots from the soil.

4. Surface trash: most machines will handle any amount of trash. Large coulters of eighteen inches or more in diameter can be used to cut trash in front of the standards. This will eliminate plugging around the standards and leave a neat job. Coulters should be set slightly deeper than the shovels for effective operation. As coulters are not standard equipment, their addition will be at the option of the individual. The use of trash rods prevents the collection of trash

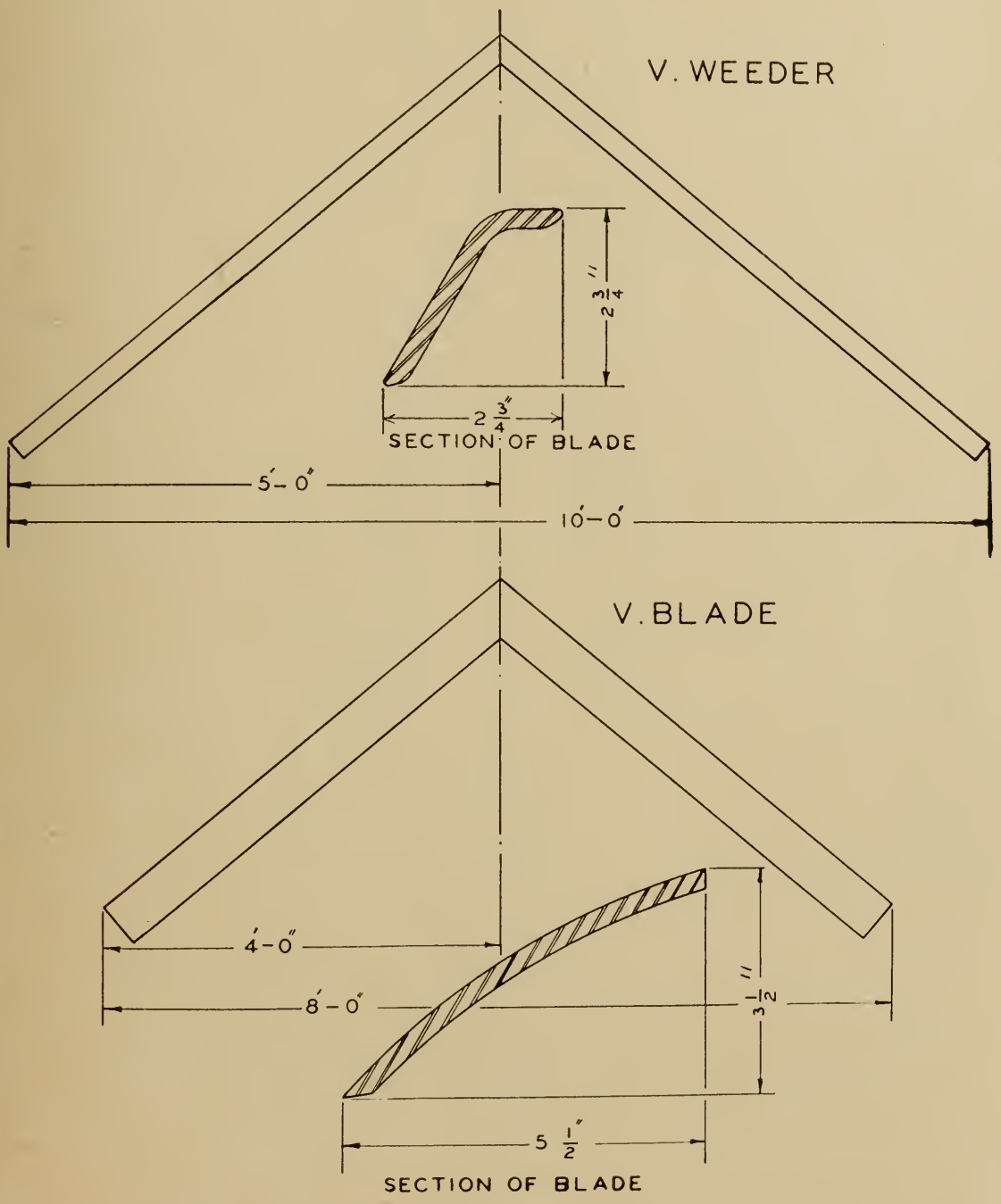


Figure 7. Illustrates the difference in pitch and width of V weeder and V blade.

around the standards. These rods are about one-half inch in diameter and eight inches long. They are welded across the bottom of the standard and the frog to cut out the sharp corner where these pieces join. Newer machines are being sold with trash rods as regular equipment. *See* figure 8.

5. Buried trash: trash buried with disk implement often causes trouble unless the blade is worked deep enough to pass underneath.

6. Choice of Blades: straight blades are recommended for stony land. The straight blade or V blade can be used for breaking, depending upon the number and size of stones to be found. Medium soils can be worked very successfully with 90- or 100-degree V's. For light loose soils 65- to 75-degree V's are recommended. To date, the 90- to 100-degree V's have shown promise in heavy clays but scouring is still the main drawback to their use in such soils.

7. Working in rough fields: rough fields make it difficult to work shallow. Deep operations are recommended until the field becomes smoothed out.

8. Changing the direction of travel: changing the angle of working the field will help to level it and prevent the formation of ridges.

9. Check the depth and the adjustment of the blade frequently. The blade cultivator is not a universal implement. Like any other tillage implement it must be used with good judgment to obtain the best results. Operating a blade without paying attention to the points mentioned will result in poor quality work and excessive cost for upkeep and operation.

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Figure 8. A blade equipped with trash rod.

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