Manual CBC

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Introduction

This manual instructs about the efficient and safe use of the “Colorado Beetle Catcher”, hereafter referred to as “CBC”. The CBC is currently available in hydraulic and electric versions. However, this manual is only applicable for the hydraulic versions.

Machine types

Machine types	Two row machine CBC 2R-E	Two to twelve row machines -Tilting- CBC 2T, CBC 4T CBC 6T, CBC 8T	Two to twelve row machines -Crusher- CBC 2C, CBC 4C CBC 6C, CBC 8C
Description	- Only 2-row - Electric machine - Pushed by hand or mount to small tractor	- Emptied by tilting into large container - Beetle and larvae exterminated by drowning - From 2 to 12-row - Hydraulic machine - Front or rear- hitch	- Beetle and larvae exterminated by crushing while tilting - From 2 to 12-row - Hydraulic machine - Front or rear- hitch

Attachment to the tractor

It is advised to use the machine in the front hitch of the tractor. While connecting the machine in the rear hitch is possible, the efficiency with which the machine catches the potato beetles is assumed to be much lower. This is due to the fact that the tractor is disturbing and trembling the beetles while positioned in the plant, which causes them to fall to the ground before the CBC passes.

In order to connect hydraulics of the machine one uses basic hydraulic hoses. For attaching the tractor by a standard three-point hitch. The top link can be attached to different holes. For transportation on the road, the top link may be attached to a static hole. While working with the machine in the field we advise to attach it to the long hole. In that configuration, the machine can level itself out and therefore performs better and more comfortably in most terrains.

Transportation on the road

For transportation on roads, we look for a suitable solution for every client. For example can the width of the 4-row CBC (4T) be confined to <3m, which is necessary for European legislation. Therefore, the outer collecting trays need to be folded upwards and locked with a pin (see figure 1b). Make sure to fasten the outer trays before folding upwards! They need to be in a fixed position by inserting the pin (figure 1a) into one of the three holes.

Figure 1a: Blocking the trays into/ removing them from a fixed position

Figure 1b: Pin which secures the upward folded trays

⚠ CAUTION! When transporting the machine on public road, **LOCK ALL TRAYS** to ensure trays will not swing into oncoming traffic or objects

Main parts of the machine

Rotors

The machine contains hydraulic Danfoss motors which make a pipe turn around. Attached to this pipe there are the plastic gills that are essential for the functioning of the machine. The rotors can be configured easily and quickly in height with a wrench. For information about how to configure the rotor position and speed properly, head over to chapter "Functioning and configuration". The hydraulics are protected from weathering and mechanical damage by metal caps. We advise to keep the protective caps mounted in order to guarantee longevity of the machine.

To prevent casualties, all rotors are protected from damage through overpressure by a safety valve that is leading the hydraulic oil back to the tractor. To power the rotors sufficiently, the tractor needs an oil output of roughly 20 tot 25 liters per minute. In case of problems with the rotors, please contact us immediately. Do not do any maintenance work on the hydraulics by yourself.

Collecting bags

The collection bags of the machine are made of truck tarp, reinforced by a rubber strip The collecting bags are flexible, as they are attached to a joint (figure 1a). They can therefore move freely in case of any irregularities in the shape of the ridges. The V-shaped form of the collecting bag pushes the crop to the side. The width of the bags can be adjusted to guarantee that no beetles or larvae fall between the bags and the ridge (figure 5a and 5b).

Wheels

The machine is carried on 4 wheels. The standard wheel distance amounts to 1,5m (for 75cm ridges) or 1,8m (for 90cm ridges). The height of the wheels determine the working height of the collecting bags, whereas the height of the rotors can be adjusted independently from the other parts.

The machine is supposed to drive on its own wheels and to merely be pushed forward by the tractor. Therefore, the top link of the machine gets attached into the slop hole with sufficient space to level itself out on uneven terrain. It is recommended to properly install the machine in order to keep the working height of the machine constant, independently of the tractors' movement in uneven terrain.

Large container

⚠ CAUTION! When lifting, tilting or lowering the machine, make sure there is no human close to the machine. Risk of crushing human parts at machine joints or being struck by the machine.

When ordering a tiltable machine with the emptying mechanism (xT) a large container is delivered. The container can be transported on the rear hitch, so that both the machine and the container can be transported simultaneously. The frame is engineered with aluminum pipes while the material for holding the beetles is made of truck tarp (see figure 3). The container is constructed in a way that it can slide inwards in order to minimize transport dimensions.
The small collection bags that are transported between the ridges are quickly filled when beetle density is high and/or a large surface is cleared. In between passages, the machine can be tilted to empty the content of the smaller bag into the large container.
After emptying, immediately the separation process is starting, during which most beneficial insects fly or crawl out of the container, while the beetle and the larvae remain unable to escape.
Close the container when leaving it unattended at the field for a while to ensure no beetles are escaping.

Figure 3: Large container for separating Colorado beetles from beneficial insects

Functioning and adjustments

The efficiency with which the machine collects beetles and larvae, as well as the degree of damage it induces to the plant is depending on two factors:
1.) The stage of the crop: The more vigorous the plant, the less efficient the application becomes and the more damage the machine (and tractor) can induce.
2.) The proper adjustment of the machine.

In the following a thorough description of the latter is given. At the basis, four configurations need to be applied in order to arrive at a satisfying result.

Proper working height

For a proper functioning of the machine it is of high importance to match the working height of the rotors and the collecting height of the bags with the stage of the crop and the shape of the ridges.

The machine can be configured and fine-tuned in many ways. However, four configurations can be regarded as of major importance: **1.) The height of the wheels and therefore the height of the collecting bags; 2.) The width of the collecting bags. 3.) The height of the rotors, 4.) The rotation speed.**

Figure 4: Adjustment of wheel height and the collecting bags

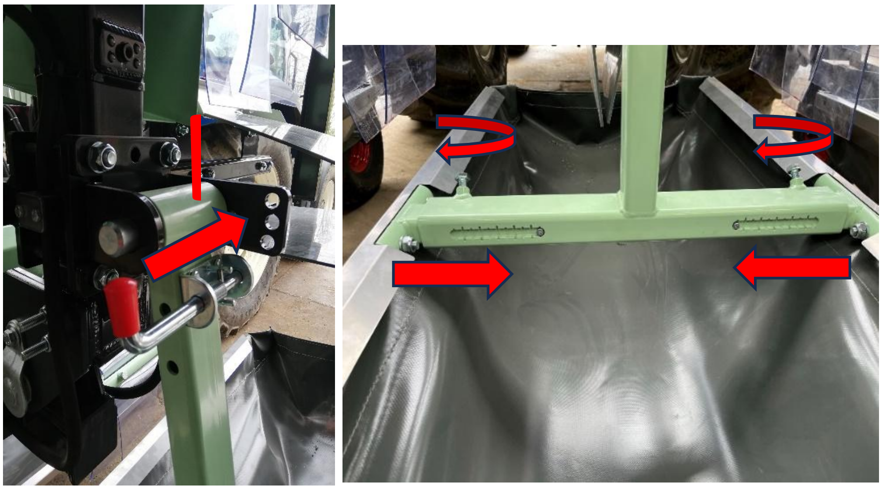

Figure 5a and 5b: Collecting bags

It is important to start adjusting the machine by determining the height of the wheels (**1**). For the best catching efficiency, the collecting bags should be positioned at the height of the base of the potato plant. The bags are carried just above the edge of the ridge in order to prevent eroding the ridge and collecting earth. On the other hand, they should be positioned lower than the height at which most plants start branching and carrying leaves. In order to adjust the height of the machine, remove the red pins (Figure 4). The wheel height can now be determined. Insert the red pins at the desired height.

> ⚠ CAUTION! Insert **BOTH RED PINS**. If only one pin is inserted, the machine can tilt unexpectedly, causing harm to humans or damage to objects

Second, one should make sure to determine the optimal width of the collecting bags (**2**). The bags should be adjusted sufficiently wide to ensure that beetles and larvae cannot fall between the ridges and the edge of the bag. However, in order to prevent erosion of the ridge and plant damage, the collecting bags should not be pushing against the ridges. They should rather be adjusted spacious with the ability to move freely when encountering irregularities or obstacles. Thereby one prevents damage by taking advantage of the flexible material of the bag as well as the movable joint on which it is hanging (figure 2a).

Rotor height- and speed adjustment

Third, the rotors should be configured to match the optimal working height (3) and rotation speed (4). Rotor height should be configured in a way that the plastic blades only touch the top 20 to 25cm of the plant and, for small plants, do not touch the base of the plant or the ridge. Rotation speed should be configured to an amount that each plant gets hit twice by a blade at each rotor.

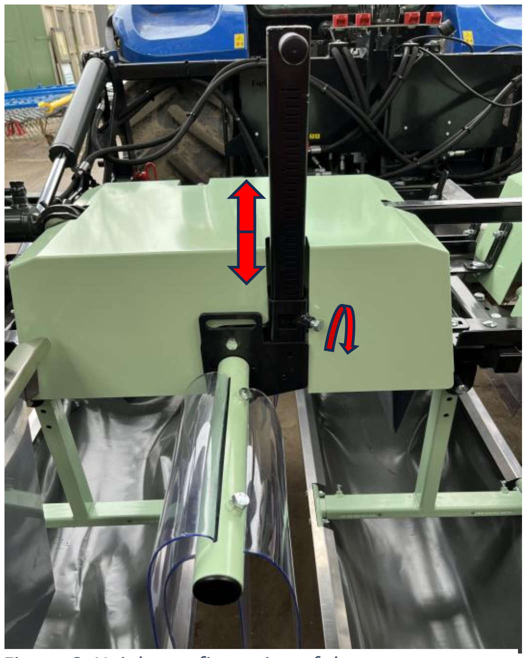

Figure 6: Height configuration of the rotor

Rotor height can be configured by unscrewing the nut and shifting the rotor to the desired height (figure 2). Careful when loosening the nut, as the rotor is sliding down abruptly and the hand can be injured between metal parts. One should only be loosening the nut when the weight of the rotor (15kg) can be properly sustained via the handle.

Rotor speed can be configured in two ways: By changing the debit of the oil flow of the tractor or by changing the resistance of the oil circuit. For the latter, a screw can be manually fastened or loosened in order to respectively increase or decrease the resistance at which hydraulic oil flows inside the circuit (see photo x). The rotor speed should be determined in a way that every individual potato plant gets hit twice per rotor with a lamella. In most cases, the debit of the hydraulic pump of the tractor should amount to 8 to 12 liters.

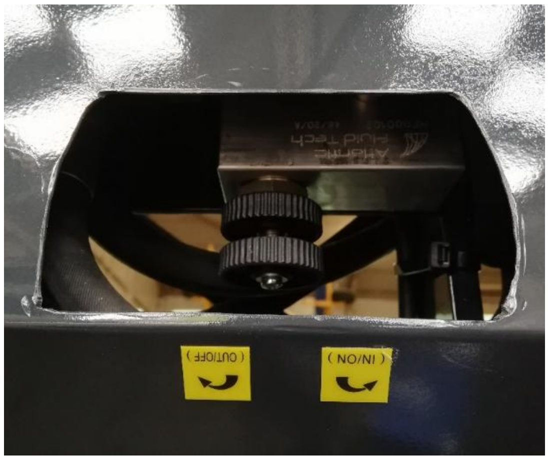

Figure 7: Manual screw to determine hydraulic oil resistance

To visualize the optimal settings, we provide a table that matches the advised rotor speed with a certain driving speed (see table x and graph x).

Speed km/h	Miles/h	Rpm
3	1,9	75
3,5	2,2	87,5
4	2,5	100
4,5	2,8	112,5
5	3,1	125
5,5	3,4	137,5
6	3,8	150
6,5	4,1	162,5
7	4,4	175

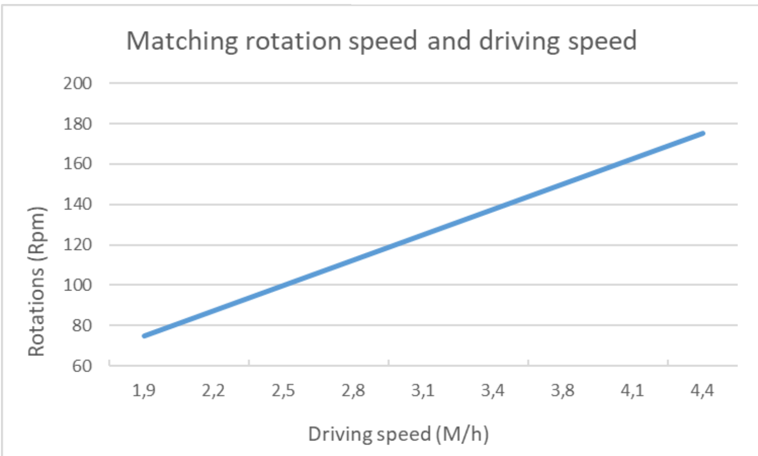

Figure 8: Proportional adjustment in rotation speed relative to driving speed

Tilting the machine

For emptying the small collecting trays or for easier transportation on the road, one can tilt the machine with the help of a hydraulic cylinder. All machines built in 2024 or later can switch between rotating and tilting by changing the directional flow of the hydraulic oil. Machines built before 2024 have to plug into an extra group of hydraulic valves for enabling the tilting function.
Machines built after 2024 can be lowered from the tilted position by rotating the rotors. This way, the hydraulic oil is flowing back from the cylinder into the circuit of the rotors.

Summarised specifications

	2R-E	**2R**	**4R**	**4T/6T/8T**
Propulsion	Electric	Hydraulic oil		
Oil throughput (L/min)		4	8	8/12/16
Working width (rows)	2	2	4	4/6/8
Transport dimensions (m) (HxBxL)	1,25 x 2,3 x 1,6	1,25 x 2,3 x 1,6	1,5 x 3,2 x 2,45	1,5 x 3,2 x 2,45 1,5 x 4,5 x 2,45 1,5 x 6 x 2,45
Net weight			560	590/760/1060
Row distance (cm)	75 or 90	75 or 90	75 or 90	75 or 90
Rotors per row	1	2		
Attachment possibilities	Fronthitch	Front- or Rearhitch	Front- or Rearhitch	Fronthitch
Hitch categories	Cat1/Cat2	Cat2/ Cat2N/ Cat 3		
Large collection container	No	No	No	Yes
Double-acting control valve	No	1 (Rotors)	1 (Rotors)	2 (Rotors and tilting)

EC DECLARATION OF CONFORMITY

In accordance with Annex II A of Directive 2006/42/EC

Manufacturer: FieldWorkers B.V.

Address: Maasdijk 58b
5307HR Poederoijen
Nederland

Hereby declares that the Machine Colorado Beetle Catcher, which mechanically knocks Colorado Beetles off the plant with the help of rotating gills,

- Complies with the provisions of the Machinery Directive (2006/42/EC)
- Complies with the following harmonized standards: NEN-EN 12100; 2010

The Technical File was compiled under the responsibility of the undersigned.

Place Poederoijen
Date 02-04-2025

Ard Klompe
Director