Successful Opening, Closing The Seed Slot With No-Till Planters And Drills

By Phil Needham

Needham Ag Technologies, LLC.
www.needhamag.com

Row Cleaners. Row cleaners clear residue and lightly till the seed zone - allowing faster soil warming. Research by Phil Needham (right) has shown that by removing residue from the soil surface and lightly tilling the seed zone, it can increase soil temperature by 6-8^{o}F compared to an area with undisturbed soil or residue. This increased soil warming aids in faster emergence, facilitates better closing and also removes heavy residue (such as corn stalks) which can cause planter unit bounce and loss of seeding depth.

Floating row cleaners are the design of choice for no-till conditions because they float and follow the contours of the ground. Ken Ferrie (Farm Journal Agronomist) was quoted within the magazine saying, "For the third year, running row cleaners so they can float over the terrain improved yields compared to the same row cleaners pinned into a static position. In 2006, floating row cleaners added 10 bu. to 13 bu. to yield in no-till fields. Ferrie believes the advantage would also be present in conventional-till fields, but would be less dramatic".

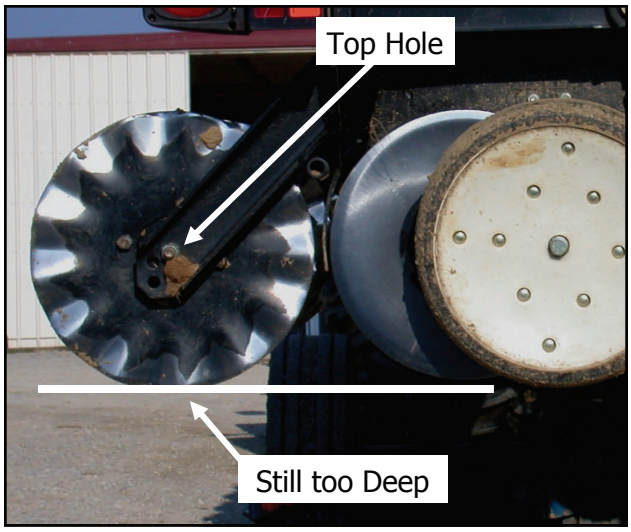
Adding aluminum side treader wheels (both images right) allows the floating row cleaner to be carried across softer areas of the soil surface plus allow the row cleaners to follow the contours of the ground without gouging. Row cleaners can be adjusted down until the fingers engage the soil to clear residue evenly, but they should not move a significant amount of soil as this can result in a depressed seed zone where water can stand and reduce emergence. Soil erosion can also occur when the seed zones are left with a depressed finish.

Wheel weights or down-pressure kits may be added to most floating row cleaners to help push tough or heavy residue aside. Wheel weights are illustrated in the image to the right and 4 weights per row can add approximately 20lb/row to help move heavy, tangled residue.

No-Till Coulters. Most successful no-tillers have removed their no-till coulters. This is a difficult step for some, but by removing one coulter and observing the results, many producers soon remove them all. The only situation where I have seen a no-till coulter to benefit is when planting into sod, where the dense mat of surface material confines the performance of the double-disc openers.

One of the problems which results from the use of no-till coulters includes throwing soils out of the seed zone (see image, upper right). This presents problems because it can lower the seed zone, which can cause ponding within the rows - especially within high rainfall areas. When soil is thrown out of the seed slot, it also makes it difficult to gather soil back up to press around the seed and close the slot (see image middle right). When soil is thrown out of the seed zone as illustrated, it can also cause the gauge wheels to ride up and compromise seeding depth consistency. This results in some of the seeds being positioned too shallow in the soil, without enough soil to cover them. This problem is illustrated in the image to the right. Bouncing of the gauge wheels can also translate into unit vibration and seed losses from the meter.

Another problem with no-till coulters is that they can produce a false floor in the bottom of the seed slot, which can lead to poor seed to soil contact and reduced emergence. This is common in dry areas and is compounded by the fact that some brands (and models) of planter do not allow the no-till coulter to be raised up above the lower working depth of the double disc openers.



The image (right) illustrates one example of a Kinze 2600, even when the no-till coulter is positioned in the top hole, the bottom of the no-till coulter is still deeper than the bottom of the double-disc opener. The solution to raise the Kinze no-till coulter up higher is to place washers or a piece of flat-bar (with holes drilled in it), under the lower side of the coulter mounting bracket. This will push the no-till coulter forward and raise it slightly.

Closing Wheel Arm Settings. Once the seed has been positioned at a consistent depth to promote uniform emergence, it is critical to close both sides of the seed slot to optimize seed to soil contact and promote even emergence.

Adjustment of the closing wheel arm (side to side) will be required if the closing wheels are not centered over the top of the seed slot. Eccentric or slotted adjustment systems are fitted to most newer style planters.

The photo (right) illustrates a poorly aligned closing wheel arm fitted with a pair of smooth closing wheels. Some producers may decide to increase the down-pressure of the closing wheel arm in higher moisture conditions, when in fact it increases the density of the soil either side of the seed slot, slowing emergence of the seedlings and resulting in sidewall compaction. The preferred option is to replace the smooth wheels with either a single or pair of spiked closing wheels.

Spiked Closing Wheels. Depending on the soils and moisture levels, both configurations can perform very well. Generally a pair of spiked closing wheels are best suited for higher moisture soils, because this combination can close the seed slot more effectively and spade both sidewalls to reduce sidewall compaction.

A single 15" spiked closing wheel alongside a smooth standard closing wheel configuration is illustrated right and these configurations perform well in minimum tillage situations and medium to dry soils. Adjusting the distance between the smooth wheel and the 15" spiked wheel is critical to their performance.

Both of the images right were taken on the same planter within the same pass, illustrating the ability to close a seed slot with a spiked wheel configuration, despite the higher moisture no-till conditions.

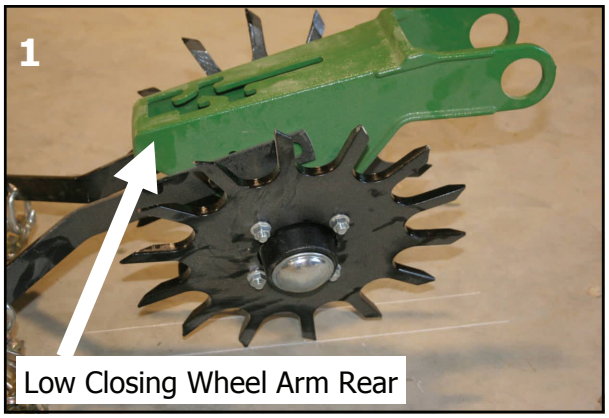
Closing Wheel Arm. Most producers are good at centering their closing wheel arm above the seed slot, but judging by my travels across the mid-west each spring, its amazing to see how many producers don't adjust their closing wheel arm to run level, especially with spiked closing wheels. While 13" spiked closing wheel are 1" greater in diameter than a standard smooth closing wheel, when they engage the soil in looser areas of the field or when operators apply too much down-force, you will find that the closing wheel arms descends too far at the back.

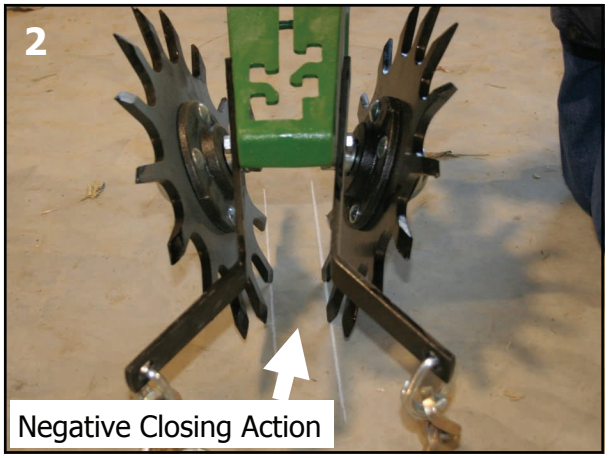
The image below illustrates the problem, the rear of the closing wheel arm is too low. It should be level at the top, not angled down.

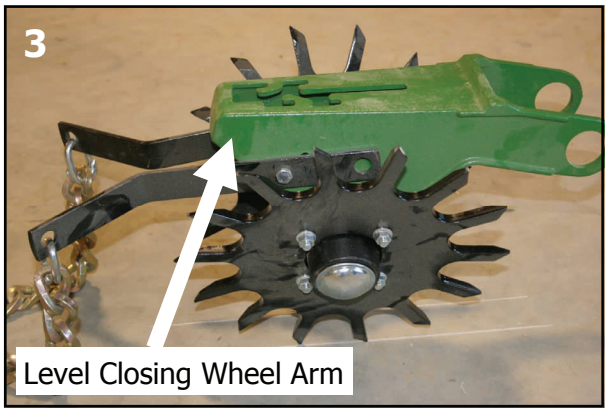
<u>The closing wheel arm angle is very important for the closing action of planters</u>, especially when trying to close the seed slot in difficult conditions. As the rear of the closing wheel arm lowers, the gathering action of the closing wheels is reduced, in fact at a point around 10 degrees less than horizontal, it changes to a negative gathering action which makes closing the seed slot almost impossible in difficult conditions.

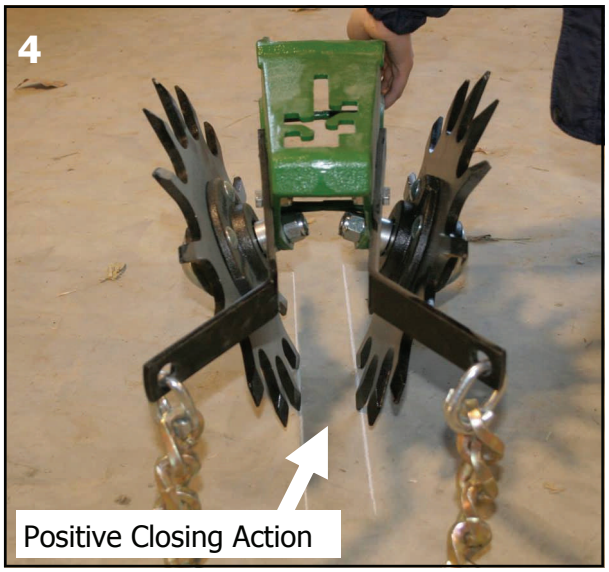
Close examination of images 1 & 2 will illustrate how the closing wheel arm (which is low at the rear) reduces the closing action and actually changes it to a negative gathering action. (look at the 2 lines drawn on the floor).

Compare images 1 & 2 to images 3 & 4 which illustrate the closing system improvements when the closing wheel arm is level.

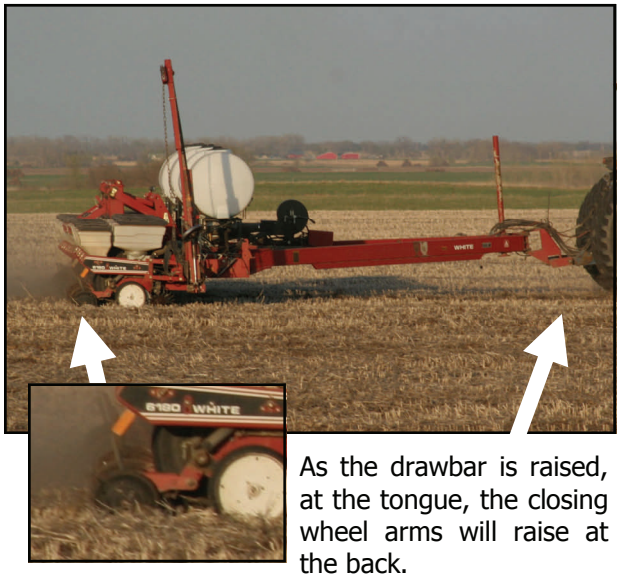






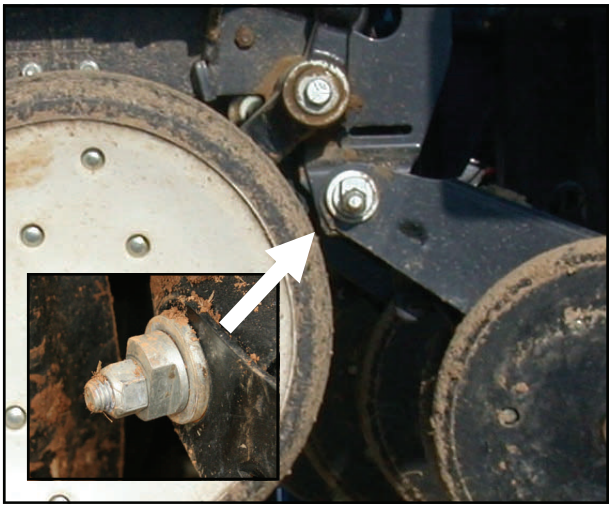


Leveling The Closing Wheel Arm. First it is very important that any brand of planter is leveled, because if your planter drawbar is down at the tongue end, the planter closing wheel arms will be lower at the back. Some planters can benefit from being slightly higher at the tongue end of the drawbar, but not by more than 2-3". The image to the right illustrates how raising the drawbar (in this example too much) helps level the closing wheel arm (also too much).



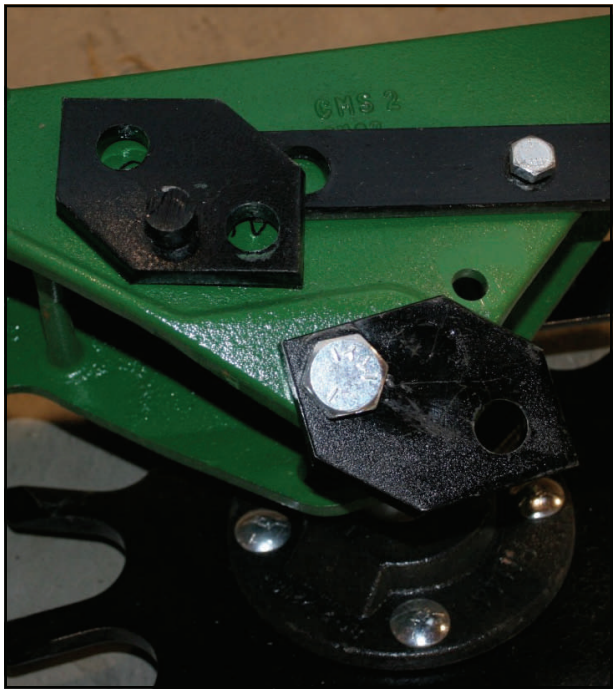
As the drawbar is raised, at the tongue, the closing wheel arms will raise at the back.

A late-model Kinze has an excellent way of helping to level the closing wheel arm, it comes in the form of an eccentric cam. This configuration is also used to center the closing wheel assembly over the seed row. The Kinze eccentric cam raises or lowers the arm at least 1/4" either side of center, so by working both sides you can lower the front of the arm and center the closing wheel arm over the row.



A John Deere is more difficult to adjust vertically as there is no eccentric cam installed within the closing wheel arm.

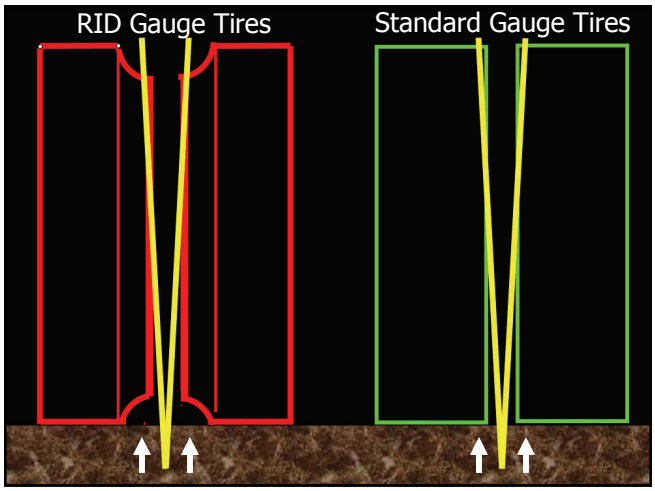
One aftermarket modification is called a drop-down kit and its shown in the image below right. This kit comprises of a small bracket which mounts to the closing wheel arm assembly (where the closing wheel usually attaches). Using a 2nd pin welded to the bracket, it mounts securely to the closing wheel arm and allows growers to mount the closing wheels approximately 1" lower (as illustrated below), thus allowing the closing wheel arm to run level and significantly improve the closing effect (especially with a pair of 13" spiked closing wheels).



Reduced Inner Diameter Gauge Tires. To reduce sidewall compaction, 4 1/2 x 16" reduced inner diameter gauge wheel tires should be fitted to planters. If you are buying a new planter, most brands can be factory fitted with them as an option, which frequently does not cost any more than standard gauge wheel tires.

Some producers in higher moisture regions also install them on John Deere single disc drills and air-seeders and claim you can return to the field a day or two sooner and also reduce the amount of sidewall compaction.

Reduced inner diameter gauge wheel tires reduce the amount of soil compression either side of the seed slot. The images below and right illustrates these benefits.



No compression around seed zone

Compression around seed zone

Drag Chains. While drag chains are a simple and economical addition to a planter, they can significantly add to the performance of a planter, especially when the surface finish of the closing system is found to be uneven or not completely closed. Such conditions are common in no-till fields and the purpose of the drag chain is to drag a hand-full of soil (as illustrated in the image to the right), level the seed zone and to drop soil into any unclosed areas of the seed slot. This technique has been found to make soil warming more uniform and help promote more even crop emergence.