Conservation Agriculture

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Because of conservation agriculture.

It's a drought year again, why your crops grow so well?
What is Conservation Agriculture?

In Brief, conservation agriculture is that technology with minimal soil disturbance, permanent soil cover and crop rotations.
Is that a lazy man farming?

It can save water and protect soil, decrease work times, reduce the cost, increase yield.
Oh? Is that so good? Why it can save water?

Straw and stubble cover on the field, no plowing
Yes, as we know, the main reason that causes the loss of soil moisture is through evaporation and runoff.
Straw cover can reduce evaporation and protect soil erosion.

Yes, water will evaporate when surface soil is exposed to direct sunlight.
The more water infiltrated into soil, the more water can be stored. Then how about protecting the soil?

Soil erosions include wind erosion and water erosion.
Wind erosion is caused by wind. Bare soil without stubble cover, is easy to be eroded which will intensify dust storm. If the soil is not plowed and covered with stubble, surface wind speed can be reduced, reinforce soil and increase soil moisture content, which will effectively decrease the amount of soil dust blown from the farmland.

Conservation agriculture field

Would you please explain further?
Water erosion occurs when the rainwater carries the surface soil with it. In no-tillage field with straw cover, can hold rainwater into soil, and reduce runoff, that’s why it can reduce water erosion.

Rainfall

High infiltration of rainwater into soil in straw covered field

Runoff

Soil erosion

High loss of soil and water on bare surface

Conservation Agriculture
Surface soil is soft and fertile so by reducing water and wind erosion, it will undoubtedly preserve soil fertility, right?

Yes. Another advantage is that straw returning to soil can enhance soil fertility, do you agree?
Of course, Yes. How can conservation agriculture reduce farming operations?

For example, after harvesting corn you need at least 5 operations like chopping straws, plowing, leveling before you can seed your next crop.
I do not plow after harvest. I chop straws if there are too dense and spray herbicide or use machine to weed. Direct seeding is done with no-till seeder. I can finish my seeding with at most 3 operations, 2 operations less than you.

Yes, how about you?
Reducing number of operations also reduces the cost of plowing, which is understandable, but can it ensure the yield?

Yes. Soil moisture and fertility increases and with good quality seeder it will definitely ensure the yield.
Let's talk about technical highlights first. Conservation agriculture begins with the management of straws, which means how to handle the straws while harvesting.
Ensure the quantity of straws and distribute them uniformly in the field which will ease the next operations.
Chop the straws while harvesting the crops simultaneously.
Use straw chopper if the harvester is not equipped with chopping mechanism, right?

yeah, yeah....
Lower yield means less straws in the previous crop. No need to chop the straws if the no tillage seeder works well and straws need to set aside during seeding.

What if there are not enough straws?
To protect soil and save water, it's better to crush them before seeding.

"It sounds easier but what to do with the thick corn stalks. Should we crush them?"
Is there any required quantity of straws?

The more, the better, only if you can ensure the seeding quality.
The second important point is:

Avoiding tillage as possible, less soil disturbance and no plowing.
Don't you know the saying: "the deeper you plow, the more moisture losses"? Only less soil disturbance can save moisture in the soil and can increase the restoring capacity.
Less soil disturbance, 
less operations, 
save money. right?

Yes!
Better not to use rotary tillage. It will pulverize the surface soil and intensify dust storm. It will also disturb the biological creatures present under the soil.
You can do sub-soiling instead of plowing, and be done when there is a soil compaction problem.
I understand.
So, what's the third point?

The third important point is:

No tillage, which is the key of conservation agriculture.
While seeding, fertilizer can be done simultaneously with no tillage seeder.
Generally, good quality no-till seeder won’t block.

But does the straw block the machine?
Is it possible to make furrow in no tillage straw covered field?

Yes, it is.
Our no till seeder can.
Does the fertilizer damage the seed?

No, the seeder drops the seed and fertilizer in different depths.
Oh, it is not as easy as I thought!

Yes, so that no-till seeding is the key.
What else to pay attention?

The last key point:

weed and pest control.
Yeah, without plowing and rotary till, what to do if the plant catches diseases?

Mix chemicals with seeds to control pest, or spray in accordance with specific conditions.
Three methods to resolve weed disease: spraying herbicide, weeding by machine and labor.
Conservation agriculture seems easy. Then what should I do to seed wheat?

Ok, Let's talk about seeding winter wheat by conservation agriculture.
So, have to start from harvest, right?

Right! Combine harvester chops the straws and distribute evenly on the soil surface.
The spreader can be equipped in harvester to ensure the even distribution of straw.

What if the harvester doesn't have the chopper?
How to do without combine harvester?

Leave the residue after harvesting.
Do the sub-soiling when there is a soil compaction problem.

Second step
How to use the chemicals to control the weeds?

Choose the right herbicide, and spray it when it is needed.
How to control weeds by machine?

Use shallow knives or sharp sweeps to till the surface soil before seeding.
Right! This is a key point of conservation agriculture.

So, the next step is seeding?
So what is the requirement of seed?

No special requirements, but should be undamaged seed, clean without foreign materials, higher germination rate, and mixed with chemicals.
Quality fertilizers, locally available. Granule fertilizer as it is applied by machine. In addition, cluster larger than 0.5cm is not permitted.
Yes! The management is similar after seeding except weed control when needed.
Can you tell me also how to seed maize with conservation agriculture?

The management begins from the harvest with cutting and chopping the stover by machine or manually.
Three methods to treat the stover after harvest.

First, chop the stover and distribute evenly on the soil surface.

Chopping by labor makes a better harvest.
In the windy areas during autumn and winter, use high standing stover to protect the soil.
Second, flatten the stover by roller and use it as the soil cover. Notice: Do it when the stover is little wet after harvest and laid on the surface. It could be done by labor or suitable machine with a tractor.
So what is the third point?

Third, leave the stover upstanding. It is common in the areas with frequent heavy wind.
Seeds and fertilizers are both important, and the requirement is the same as wheat.
It will save lots of work!

Yes, it will!
Is it time to apply pesticide after sowing?

You are right!
Are there any special requirements for the maize management?

No.
Other managements such as chopping, rolling, additional fertilizer, weed and pest control can be applied according to the requirements.

I think it is not difficult!
Spring maize can also be seeded using ridge tillage. The best way for using this kind of tillage is keeping the original ridge to eliminate the tillage, and direct seeding on the beds.
Almost the same. Most of them can be seeded with conservation agriculture, such as rice, bean, and millet.
If we have the irrigation facility, can we irrigate the crops?

Irrigation can be applied the same as the conventional treatment.
Since we are talking about the irrigation, how about the annual double crops region? Is the conservation agriculture can be practiced there?

Of course. The conservation agriculture can be absolutely practiced in that region.
In the wheat-maize rotation crops a year field, direct seeding of maize by no tillage or strip-tillage after harvesting winter wheat and direct seeding wheat by no tillage after harvesting summer maize.
So, what will happen to the yield if the two crops a year are both seeded without plowing?

There is nothing to be worry about. The productivity can be assured and the benefits can be even better.
Input and yield are both high in annual double cropping areas. Some fields even get the yield of 15t/ha, which we called “Ton-grain field”.

Please tell me some, I want to know it.
If the conservation agriculture was practiced, the labor and time could be saved, input could be reduced, therefore, efficiency could be increased.
Furthermore, straw burning can be avoided once the conservation agriculture applied.
I totally agree with you! Smog produced by the straw burning will pollute the environment, affect the daily traffic, and is also loss of resources. It should be completely prohibited!
For example, in Shaanxi province along the Great Wall, the spring maize plants residue on the treatment field are being used in sandy area. In this treatment, the maize is harvested manually, and 0~30cm residue is remained on the field to conserve the soil. Next year in spring, direct seeding is done.
Yes! That's why we choose the conservation agriculture now, in which the straw was chopped after harvesting the crop and conservation agriculture can be done.

It was really difficult practicing traditional agriculture in comparison with the conservation agriculture.
Therefore, it is much easier for sowing with conservation agriculture.

Right!
As you said, the conservation agriculture is indeed a good system. In my opinion, no tillage seeder is very important in practicing conservation agriculture.

You are right! The technology of developing no tillage seeder and other equipments are important in realizing the conservation agriculture.
Please introduce the technology of conservation agriculture equipments in details. I'm interested in this kind of machine.

Sure. Let's talk about the no tillage seeder.
No tillage seeder can open the seeding and fertilizing zone, soil covering and pressing. Furthermore, it needs to have the special ability of anti-blocking, stubblebreaking, seed and fertilizer separation, and depth controlling.

No tillage seeding is difficult.
We have several technologies. The first method is applied with double-frame structure to increase the spacing of the opener. Straw clearing and anti-blocking are the basic requirements of no-tillage seeding. But how to realize the two functions in no-till seeder?
It is really simple and practical method to realize anti-blocking, but I'm afraid that the anti-blocking ability is limited.

That’s why we use this technology on the no tillage winter wheat seeder which is broadly practiced in one crop a year region. The second method is applying disc opener to achieve strip-chopping and stubble-cutting.
Disc opener? Maybe it can realize anti-blocking function when it is rolling.

But it needs huge weight to penetrate the soil. Disc anti-blocking method is widely used in the world.
There are also other power driven anti-blocking technologies, such as strip-rotating, strip-chopping, straight knife anti-blocking and power-disc anti-blocking, etc.

Is there any other anti-blocking method?
So the stubble breaking and soil penetrating refers to the opener penetration on the no tillage field, is there any special requirements?

Yes, the no tillage seeder requires high ability of the opener to penetrate the soil, especially when the no tillage field is hard.
Thanks for your information about conservation agriculture. I will use this method and will also introduce it to my friends and relatives.

It is my pleasure! Wish you for better benefits from conservation agriculture.