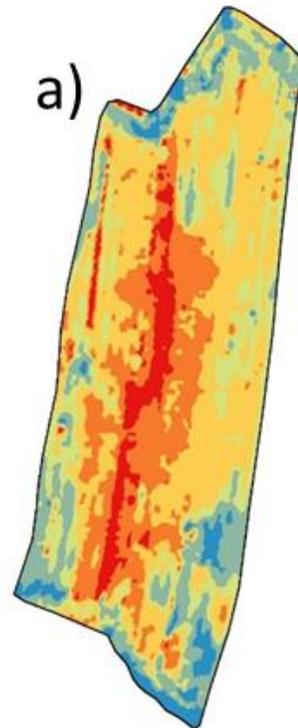
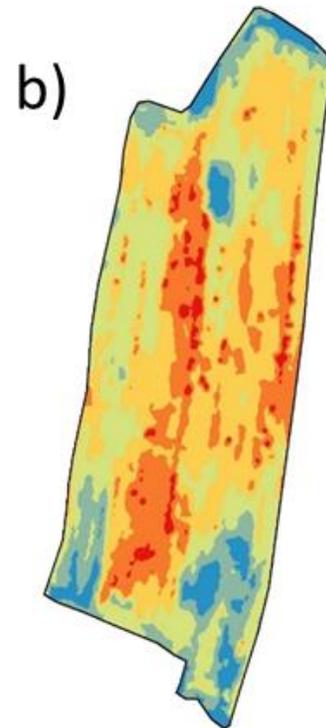


8. LESSON

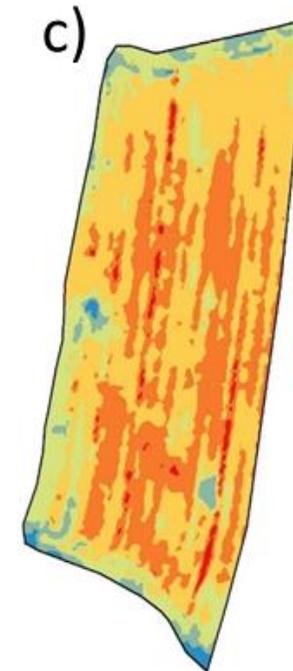
PROBLEMS ASSOCIATED WITH YIELD SENSOR USING



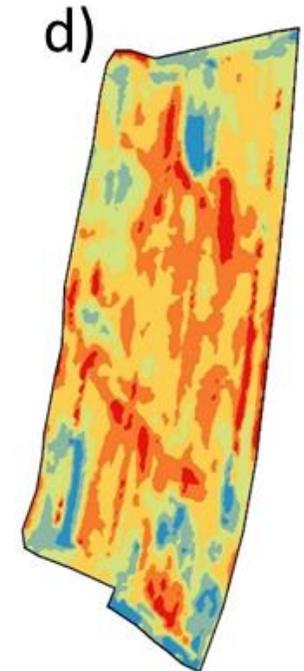
a) Winter wheat 2014
Yield ($t \cdot ha^{-1}$)



b) Spring barley 2015
Yield ($t \cdot ha^{-1}$)



c) Winter rape 2016
Yield ($t \cdot ha^{-1}$)



d) Spring barley 2018
Yield ($t \cdot ha^{-1}$)

Grain yield sensors

Question: Do I have a yield sensor mounted on my combine?

Answer (under CR conditions): If you own a relatively new high-performance combine harvester, it is very likely that it is already equipped with a yield sensor from the factory.

Question: And does the yield sensor work on my combine?

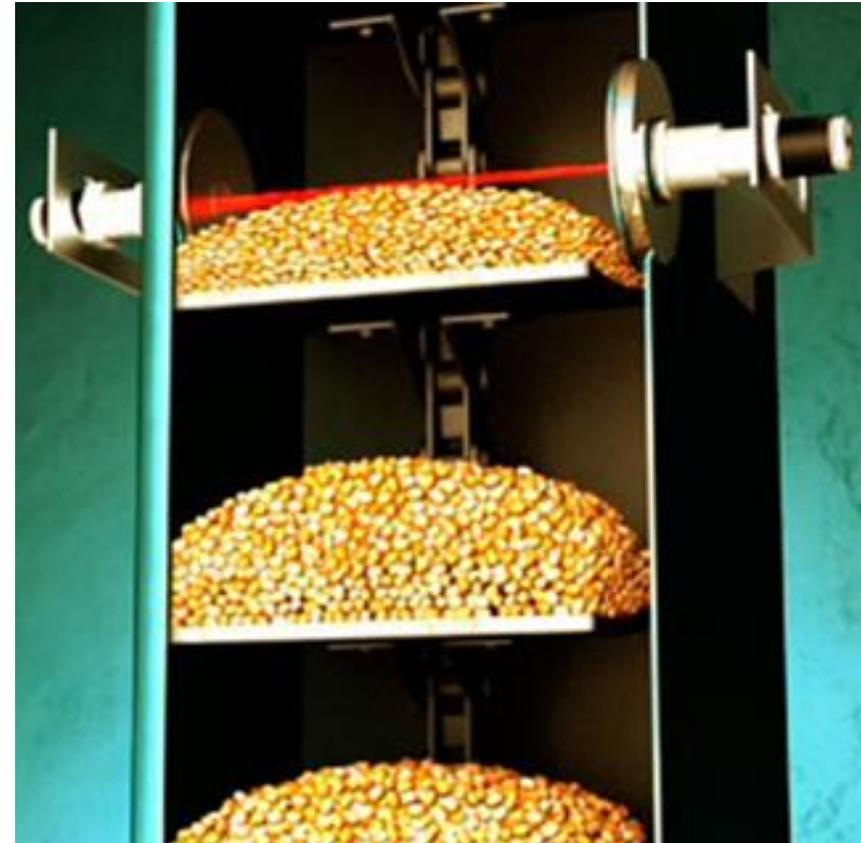
Answer: Very probably not when you ask this question.



Question: And what should I do to make it work for me?

Answer: Ask your dealer about the conditions that need to be met and how much it will cost. Usually you will be surprised that there are not many conditions and the price is acceptable.

Many modern combine harvesters are equipped with yield monitors from the factory. However, they are not used, even though the cost of using them is small.



Question: I have a yield monitor connected and yield mapping works for me. Is its function correct?

Answer: Most likely not. Keep in mind that yield monitor only estimates yield (Lesson 3). Calibration is necessary.

Question: Is yield monitor calibration complicated?

Answer: The answer is not entirely simple. The calibration itself is simple. All you have to do is enter the value of the actual weight of grain per wagon into the on-board computer. This usually needs to be done multiple times. During the harvest, there is a problem assigning the weight of the correct wagon to the appropriate weight calculated by the on-board computer.

Calibration of the yield monitor itself is not complicated, but it is often organizationally demanding.

Question: Is yield mapping itself difficult for combine drivers?

Answer: No and yes. Yield mapping usually runs automatically, but the driver must keep it under control. For example, he must ensure that a correct crop is entered in the on-board computer.

Question: Do yield mapping systems also require any maintenance?

Answer: Of course yes. Impact yield monitor plates must be kept clean. As well as slides of light beam sensors, etc.

Using a yield monitor puts greater demands on the driver than if he did not use it.



Question: Is the accuracy of grain yield monitors sufficient for the needs of precision agriculture?

Answer: Despite all the above-mentioned problems, mapping yields directly on combine harvesters is potentially the most accurate method of evaluating grain yield.

Question: And what is it good for?

Answer: Yield mapping is in the last and, actually, also in the first place in the chain of precision agriculture. Lastly, because the yield map evaluates the success of all previously performed interventions in the crop growing chain. In the first place, because the yield in agriculture is primarily, and not only in precision agriculture.



Forage harvesters

Question: Do I have a yield sensor mounted on my forage harvester?

Answer (under CR conditions): Very probably not. Yield monitoring systems in forage harvesters are still optional only or on demand.

Question: And is it possible to buy them?

Answer: Together with a new self-propelled forage harvester, usually yes.

Yield mapping systems are not nearly as common on other machines as on combine harvesters, if they are available at all.



Question: Is forage harvester yield monitor calibration complicated?

Answer: The process of calibrating the forage harvester yield monitor is more complicated than the grain yield monitor for a combine harvester. In addition (as opposed to grain yield monitor calibration) it is usually necessary to set up zero point of feedrolls. Usually you will have to look at the operator's manual of your specific machine how to do it. Other calibration issues are similar to combine harvesters.

Question: Will the accuracy of the whole system be the same as for grain yield monitors?

Answer: Most likely not. Fodder is a much more heterogeneous material compared to grains. Also, partial calibrations during the harvest will need to be done more often. Nevertheless, it is still the most accurate method of forage yield estimating.

Calibration of yield monitors on forage harvesters is even more challenging than for combine harvesters. Harvested fodder is a very inhomogeneous material compared to grain.

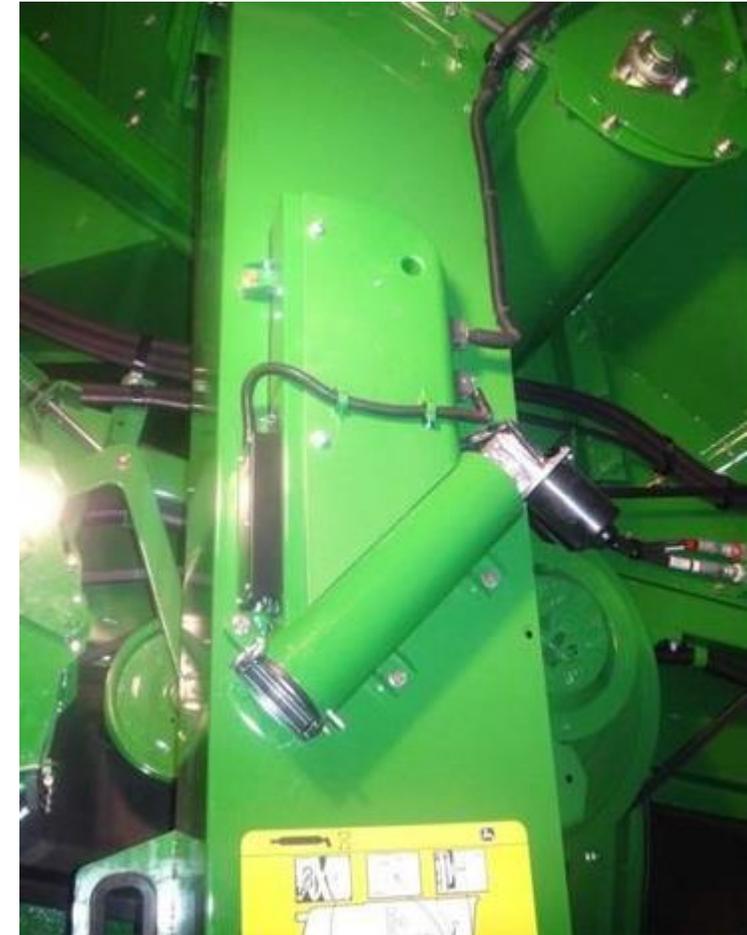
Material moisture sensors

Question: Is it more difficult to measure the throughput of the material or its moisture content?

Answer: Although measuring the throughput of plant materials is relatively complicated, measuring their moisture is even more complicated. Accurate methods of measuring the moisture of plant materials (oven drying) are very time consuming. Accurate real-time moisture content measurement is still challenge.

Question: Is the moisture content measurement accuracy sufficient?

Answer: For yield mapping purposes yes. Accuracy increases due to the large number of measured values. Proper calibration of the moisture sensor is essential.



Mowing machines

Question: Is it possible to buy yield mapping system for smaller tractor mowers?

Answer: Not at the moment. Theoretically, this would only be possible for mowers equipped with a conditioner.

Question: Why is that so?

Answer: Forage crops are very inhomogeneous, technical solutions are not universal enough, the price of measuring systems is still high compared to the price of the machine.



Root crops (sugar beet, potatoes etc.)

Question: Is it possible to buy yield mapping system for root crops?

Answer: As in the previous case not at the moment.

Question: Why is that so?

Answer: Non-smoothed flow, high mass yields and large range of the harvesting conditions cause serious problems during non-combinable products yield mapping. Accuracy of the sensors should be improved and stabilized. Functionality of the sensors must be simplified, especially calibration.



Question: For which crops could continuous weighing be used?

Answer: Practically for almost everyone. It is possible to weigh the grain hopper of the combine harvester, the hoppers of potato or sugar beet harvesters etc. Or it is possible to weigh transport wagons or round balers.

Question: Is it possible to buy a continuous weighing system?

Answer: As in previous cases, not in the moment. The measurement errors of these systems are relatively large as a result of large ratio between the weight of the container (trailer, bin, tank, bunker) and the weight of the inkrement, vibrations, admixtures....



***Thank you very much
for your attention!***

František Kumhála