

Production quality assessment Dodder case in alfalfa seed

FRENCH REGULATORY REQUIREMENTS

The seed growing contract is compulsory in France with an obligation of results in terms of seed quality. The seed grower is bound to deliver the whole seed quantity harvested. The seed company has to pay the seed growers a fixed price based on the yield potential of the variety and the quality requirements.

Seeds must meet specific purity, count of certain weeds and germination rate standards. Each batch is tested independently. The results determine the income of the farmer, who is only paid for the net quantity of seed that meets the standards. The standards for the certification of the batch are in reference to the technical regulation of the French seed interbranch (SEMAE). More restrictive standards may also be set by the establishment in the multiplication contract, generally valued in the form of quality premiums for remuneration. Approval analyses are carried out by the seed companies in its own approved analysis laboratory, or by independent laboratories such as Labosem.

DODDER - BIOLOGY, FRENCH REGULATION AND CONTROL METHOD

Dodders are non chlorophyll-containing parasitic plants. There's more than 175 species in the *Cuscuta* genera. Several of them can grow on alfalfa (*Medicago sativa*) among other legumes plant.

Two species are commonly found in alfalfa seed production and are of economical importance:

- **Common dodder: *Cuscuta epithymum*.** The seeds are less than 1mm diameter
- **Field dodder: *Cuscuta campestris* Yuncker.** The seeds are a little bigger, above 1,3mm.

As it can dramatically reduce the yield, its' presence is prohibited in fields and especially in certified seeds batches. Because any seed found in a batch would spread the parasitic plant in new plots.

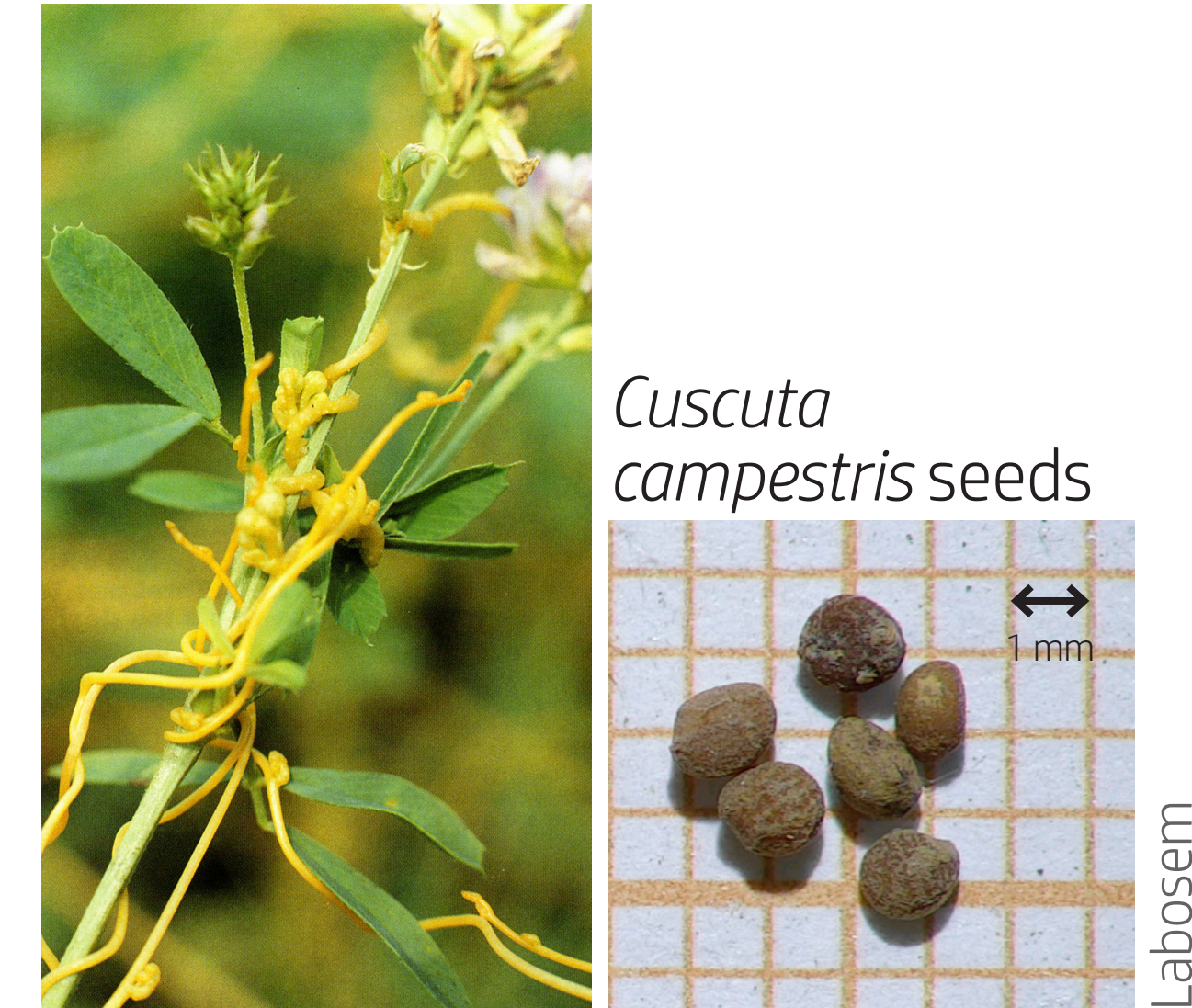
So these undesirable and parasitic species, especially of alfalfa, are regulated with a « 0 » standard in cultivation (0 plants with dodder in the plot) and in the sorted lot (0 dodder seeds on a 100g sample).

But field control methods are very limited, with only one effective active substance: pendimethalin (PROWL 400, NIRVANA S). So a specifically adapted sorting by the laboratory and by the factory is essential.

Before certification, right after the first sorting machine, Labosem check on a 500g sample if there's any *Cuscuta* seed. And if so, these will be removed by the following machine in the process which will be use in a more intensive way, to get rid of it, even if it's mean removing some good seeds.

If sorted in the seed company factory, the machines used can be different. Still, after the first step, presence of dodder seeds in the batch is checked.

A well developed *Cuscuta sp.* on *Medicago sativa*



Cuscuta seeds (circled in red) in alfalfa batch. Not always easy to spot! Other impurities found : inert matter (such as seeds parts and other plants debris, rocks, soil), other plants or weed seeds.

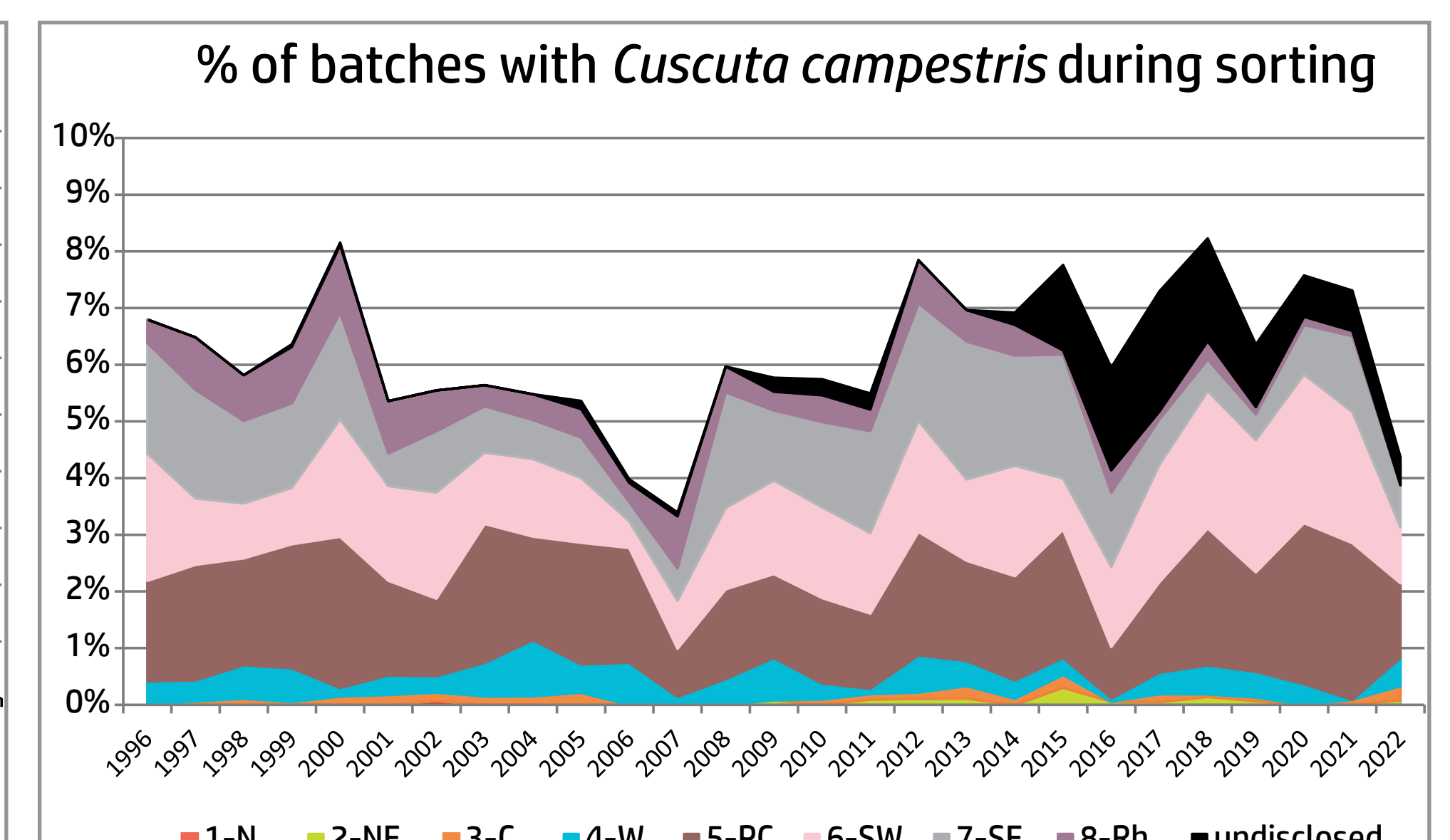
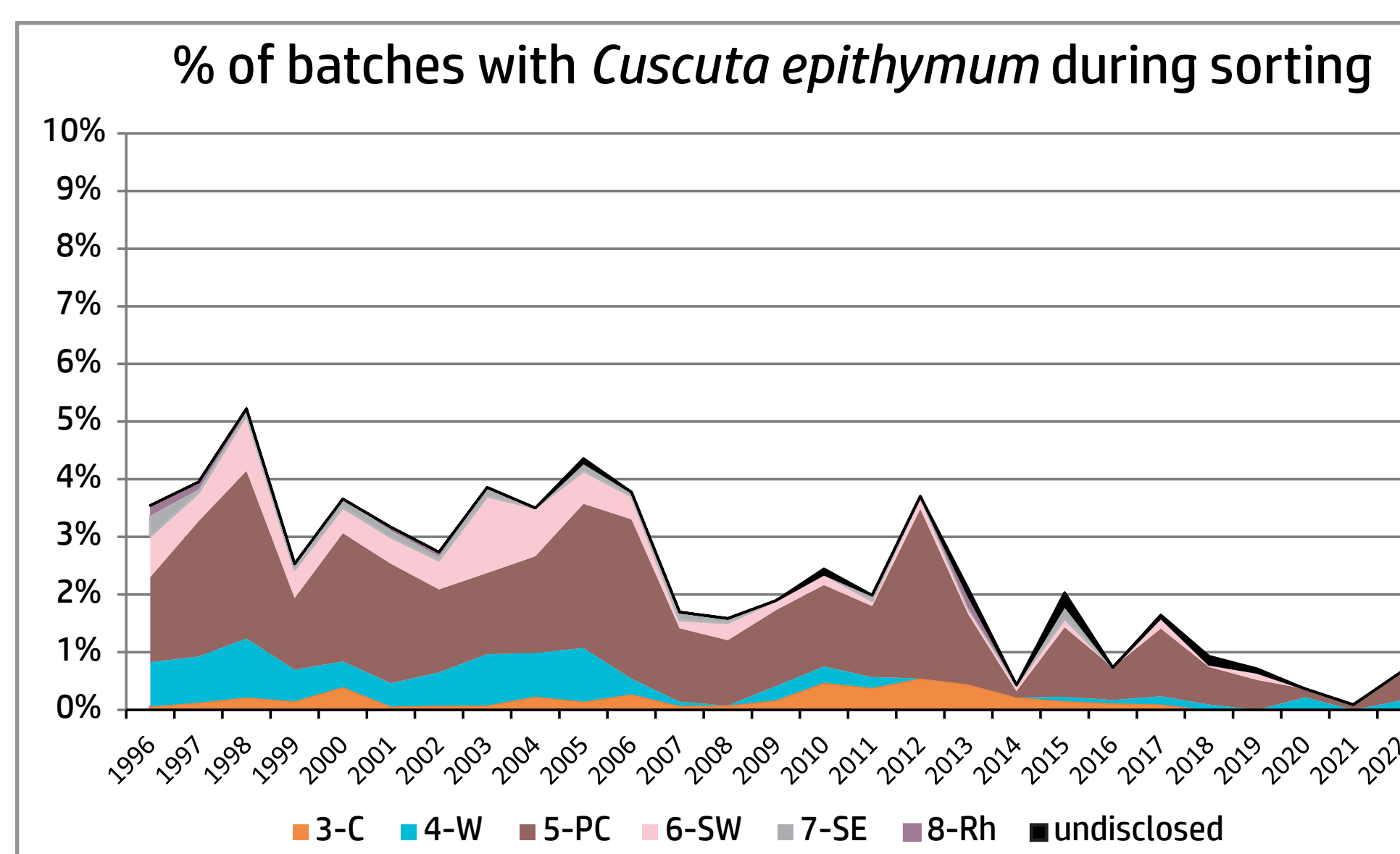
SPATIAL AND TEMPORAL EVOLUTION OF DODDER IN ALFALFA SEED BATCHES



- 1 - North
- 2 - North-East
- 3 - Center
- 4 - West
- 5 - Poitou-Charentes
- 6 - South-West
- 7 - South-East
- 8 - Rhone

Every year, between 1000 and 2000 alfalfa batches are sent for analysis to Labosem. The presence of dodder in each of them is visually assessed during sorting, after the first separator.

After sorting, no certified lot exceeds the « 0 » standard (mandatory). After the first sorting machine, the two dodder species are present in an average of 8.5% of the batches - that is 3 356 among the 39 306 analysed by Labosem between 1996 and 2022 (some batches can have both species but they count only for 0.14% of the total).



Cuscuta campestris is still found in a constant % of batches. There's some variations between years but no decrease observed for now. From 1996 to 2022, the average is 6.2% of all the batches, varying from a 3.4% minimum in 2007 to a 8.2% maximum in 2018.

Cuscuta epithymum tends to disappear since 15 years, no matter how many batches have been through the Labosem process. The 27 years average is 2.3%, with a minimum in 2021 at 0.1% and a 5.2% max in 1998.

Each species is regionalized:

- *C. epithymum* is mainly found in the Poitou-Charentes area (region 5). For the last 15 years *Cuscuta epithymum* is not found at all in 2 areas, north and north-east
- *C. campestris* is mainly detected in the Poitou-Charentes area (region 5), south-west (region 6) and to a lesser degree in the south-east (region 7).

CONCLUSION

Cuscuta sp. is still found commonly in fields but crop monitoring, use of pendimethalin and sorting are the main paths to keep the alfalfa seed production healthy and limiting the parasite spread.

Alfalfa certified seed plays an important role in the control of this parasite in fodder production.