

An innovative crop association: Producing red clover seeds in crimson clover seeds fields

BACKGROUND

The yields of red clover seed production have been decreasing in France in the last decade, mainly for strong pest pressure (*Protapion trifolii*) with the loss of insecticide and bad climatic conditions.

Weed control is also difficult for seed growers when red clover is sown in bare soil due to its slow establishment and a low competitiveness against weeds. Combining red clover seeds with other crops makes it possible to cover the inter-row and limit the development of weeds. A lot of FNAMS trials have been conducted and showed interesting results with mustard, niger (*Guizotia abyssinica*), buckwheat, millet as companion crop and with spring barley, forage maize, buckwheat as harvested cover crop followed by red clover seed harvest the year after. But why not go further with these associations? Why not harvest two crops from two successive seed crops in the same year?



Crimson clover is an annual clover which is more vigorous at the beginning of the cycle than red clover. It covers the rows more quickly. This significant difference in precocity with red clover could permit to harvest the two species as seeds at two different times.

METHODS

Three years of tests (2020-21-22) were carried out in two experimental stations of FNAMS: in Bourges in central France and in Brain-sur-l'Authion in the West. The clovers were sown at 6 kg/ha the same day at the end of the summer. Red clover was either sown alone «solo red clover» or associated with crimson clover, one row out of two each. Several measures were made during the trials: clovers or weeds biomasses, yields, germination ability, ... *Protapion trifolii* populations were also monitored with frequent and regular captures with a semi-circle butterfly net.



Experimental plot in Bourges: red clover associated with crimson clover, one row out of each.

Table I - Main dates for the three years of trial

Harvest Year	Location	Sowing date	Cutting date	Harvest date		
				Associated red clover + crimson clover		Solo red clover
				Crimson clover	Red clover	
2020	Bourges	1-12 th sept.	28 th April	1 st June	3 rd Sept.	4 th August
	Brain		6 th May	29 th May	3 rd Sept.	24 th August
2021	Bourges		1 st June	25 th June (hail)	Not harvested	26 th August
	Brain		3 rd May	16 th June	30 th August	10 th August
2022	Brain		26 th April	31 st May	12 th August	2 nd August

RESULTS

The harvesting of the crimson clover seeds in late May or early June served as a cutting for the following red clover seed crop. Once the crimson clover seeds were harvested, the red clover needed a substantial supply of water (by rain or irrigation) to restart and flower. Since crimson clover is an annual specie, it usually does not grow again in the red clover, and the seed weight of the 2 species is different allowing in any case a potential cleaning.

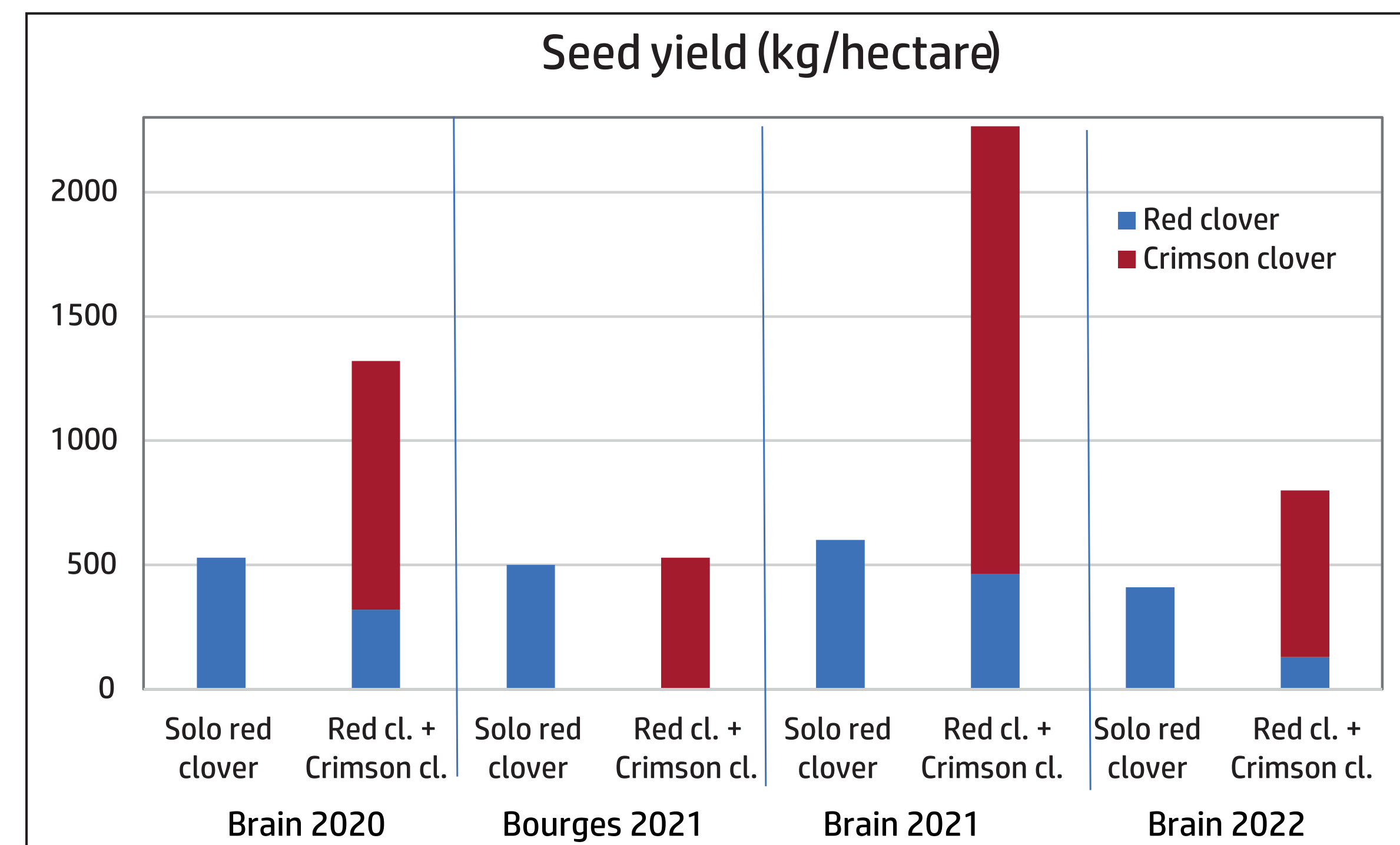
Yield and seed quality

Seed yield: the association of the 2 clovers performed better in Brain compared to Bourges.

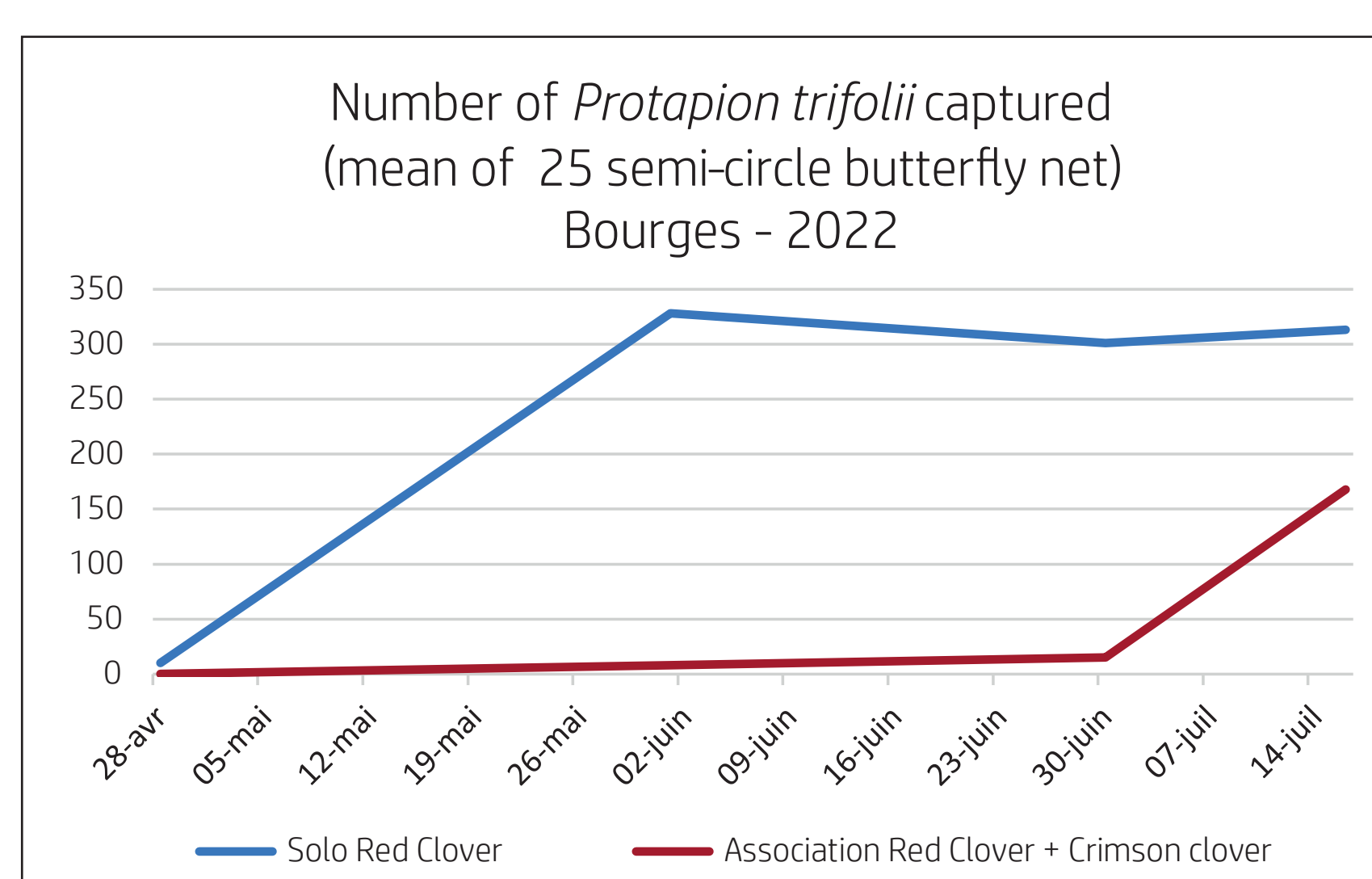
Brain: For an average solo red clover seed yield of 510 kg/ha, the red clover - crimson clover association produced an average of 1156 kg /ha of crimson clover plus 305 kg/ha of red clover.

Bourges: The associated red clovers plots were not harvested in 2020 or 2021, due to harsh weather conditions in these summers: heat waves and droughts. It suffered severely from the lack of water after the crimson clover harvest.

Seed quality: good germination & purity results in all the trials.



Red clover one month after the harvest of crimson clover



Protapion trifolii management

In the line graph, the population peak of *Protapion trifolii* occurred around June 2nd in the "Solo red clover" reference plot and after July 14th in the associated red clover. The number of captured *Protapion* is also much lower in the association: more than 300 *Protapion* for 25 whacks of the butterfly net in the "Solo red clover" against around 150 for the association around mid-July.

→ The delay in the flowering date of the associated red clover indirectly allows better management of *Protapion trifolii* populations with a delay in the sensitive stages compared to the population peak.

PERSPECTIVES

This technique to harvest the two successive seed crops the same year is encouraging, but strongly dependant of climate summer conditions and/or water supply. It must be confirmed by further trials.

Other associations with red clover should be experimented. Several trials are currently carried in FNAMS experimental stations with other clovers, such as squarrosom clover or other species.

M. BOUVIALA
S. BOUET
FNAMS

marion.bouviala@fnams.fr
Maison de l'agriculture
18230 Saint Doulchard
France

Project financed by

