



inov3PT
SEED POTATO
FOR THE FUTURE

Variety identification in the seed certification process

Multiplexing of SSR markers to improve the official method in France

Méar, A.^{1,2}, Desdouets C.^{1,2}, Laversin, N.³, Riquiez, X.³, Le Bechennec, S.⁴, Depasse, F.⁴, Flodrops, M.⁴, Madruga, F.⁵, Passeret, C.⁵, Bronsard, G.⁶, Wambre, V.⁶, Esnault, F.², Le Goff, I.², Marhadour, S.^{1,2}

Context

Single sequence repeat (SSR) markers are essential tools to fingerprint varieties for their identification. Six coordinated French partners are using the same procedure which is officially used in the seed potato certification scheme in case of doubt or fraud, and to manage genetic resources. An adaptation of the official method was carried out during the IdEvol research project (2019-2023) supported by the French Ministry of Agriculture, to evaluate the suitability of the Qiagen QIAxcel Advanced capillary gel electrophoresis as a replacement for the polyacrylamide gel-based method used for testing SSR markers.



Current kit of 9 SSR markers on QIAxcel (QXL)



Marker*	Chr.	#alleles	Molecular weight QXL (bp)	Multiplexes composition
SSR1	8	17	200-228	
STM2005	11	8	167-195	
LEMALX	5	5	121-133	***
STM1097	7	9	230-280	
STM5136	1	13	226-257	
STM5140	4	8	175-197	
STM5148	5	15**	397-481	
STM2028	12	7**	289-410	
STI028	11	8**	165-204	

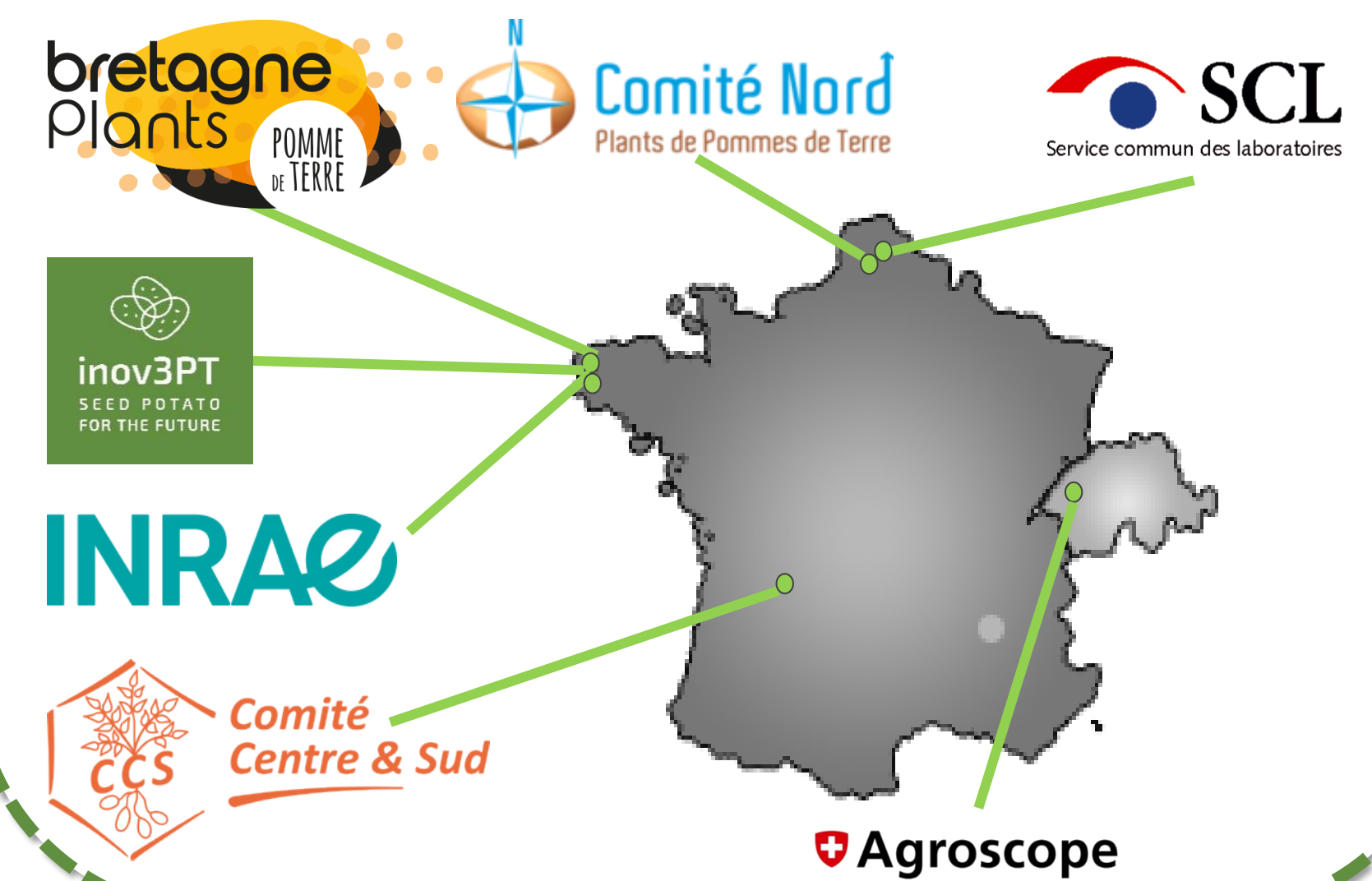
* references of the markers : SSR1 (Kawchuk *et al.* 1996), STM2005 (Milbourne *et al.* 1998; Maras *et al.* 2017); LEMALX and STM1097 (Milbourne *et al.* 1998), STM5136, STM2028 and STM5148 (Reid and Kerr, 2007), STM5140 (Ghislain *et al.* 2004), STI028 (Feingold *et al.* 2005).
** data acquisition in progress
*** LEMALX marker could not be multiplexed due to specific PCR conditions.

What were the objectives?



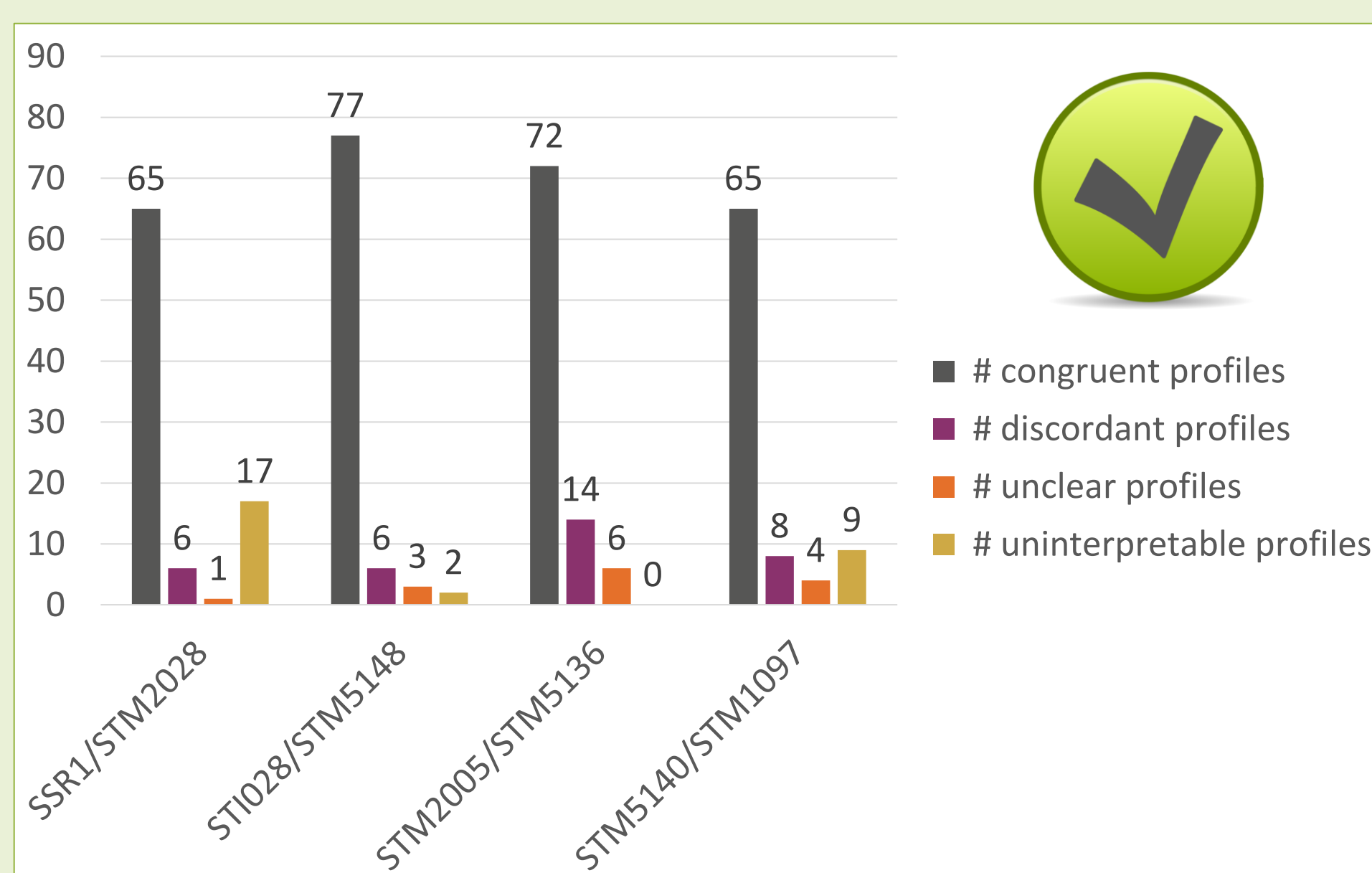
A network of partners

7 partners are operating using a common set of markers. The network is coordinated by inov3PT.



How we assessed the multiplexes

- ❖ Optimization of PCR conditions for QIAxcel: Evaluation of Touchdown PCR, adjustment of primers concentration (data not shown).
- ❖ These new multiplexes were applied to genotype a panel of 300 samples in one lab.
 - ✓ Majority of profiles were mostly comparable to those obtained with the previous method.
- ❖ The multiplexes were assessed in 5 additional labs using a panel of 22 varieties with 12 common control varieties. Results were mostly congruent (see below).



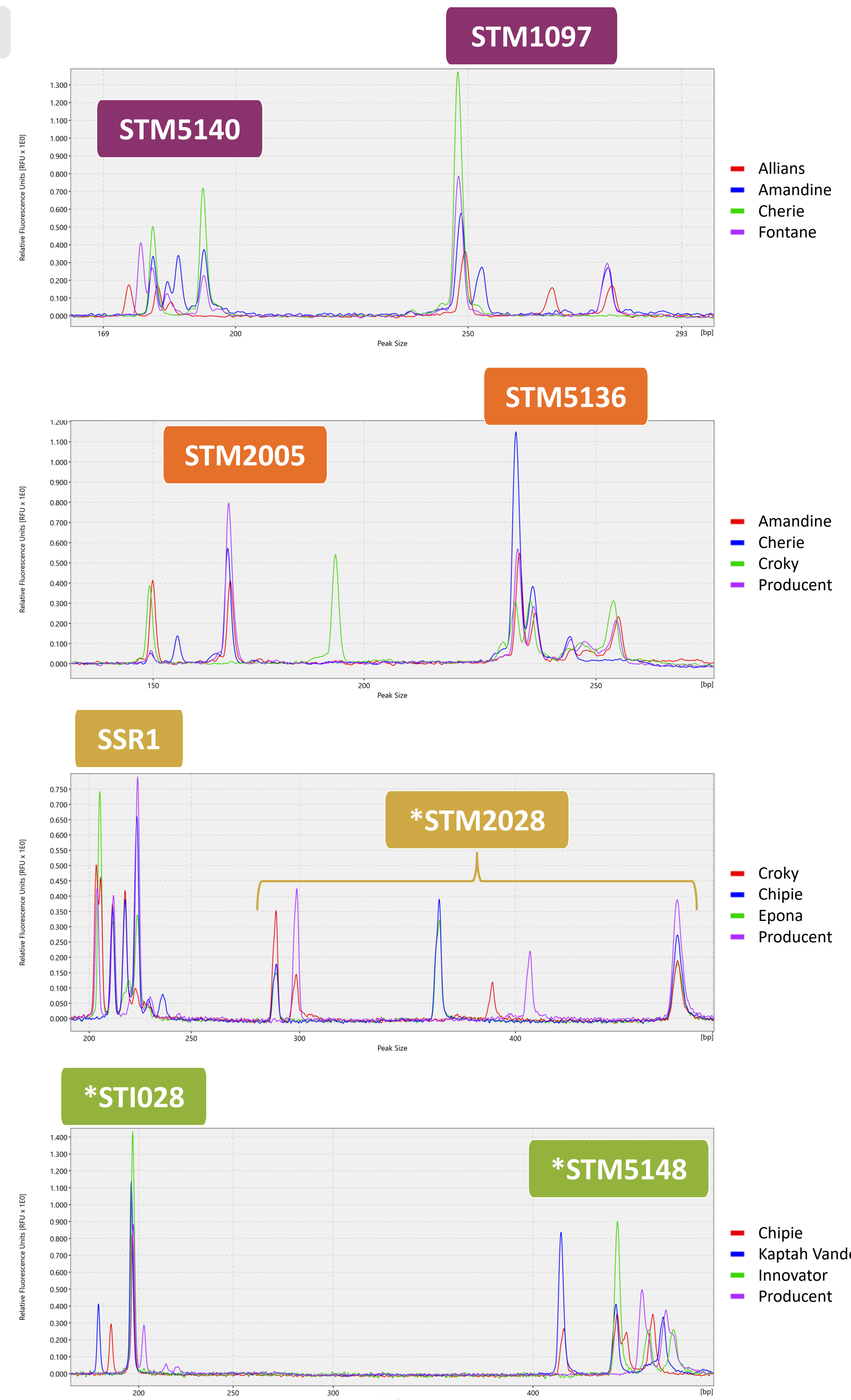
Prospects

- ➔ Data acquisition in progress for new markers
- ➔ New procedure about to replace the official one.

How the established multiplexes look like

The electropherogram profiles obtained using the 4 multiplexes are presented below (4 superimposed profiles corresponding to 4 varieties).

*New markers to complement the kit



Addresses

¹ inov3PT, Paris, France, ² IGEPP, INRAE, Institut Agro, Univ Rennes, Ploudaniel, France, ³ Comité Nord Plants, Achicourt, France, ⁴ Bretagne Plants, Hanvec, France, ⁵ Comité Centre et Sud, Laurière, France, ⁶ Service Commun des Laboratoires, Villeneuve d'Ascq, France



20th Joint Meeting of EAPR 'Breeding and Varietal Assessment' and EUCARPIA 'Potatoes' 2025



RECHERCHE - DEVELOPPEMENT - INNOVATION
DES PRODUCTEURS DE PLANTS DE POMME DE TERRE