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**INTERNATIONAL UNION FOR THE PROTECTION OF NEW VARIETIES OF PLANTS**  
GENEVA

**WORKING GROUP ON BIOCHEMICAL AND MOLECULAR  
TECHNIQUES AND DNA-PROFILING IN PARTICULAR**


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MICROSATELLITES FOR VARIETY DISCRIMINATION IN POTATOES

*prepared by experts from the United Kingdom*

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## **Variety Identification of Potatoes**


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## **Variety Identification of Potatoes**

**The Problem :**

- **Variety identification is an important quality control and consumer protection issue**
- **Current methods (e.g. morphology, protein electrophoresis) can be inconclusive and not sufficiently robust**
- **DNA profiling methods are becoming the method of choice in other areas.**


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 **Variety Identification of Potatoes**

- Inter-SSR PCR found to be unreliable
- SSRs therefore used
- Many available in the literature
- Following evaluation, selected 10 (on different linkage groups)
- Used to analyse 50 varieties (x 3 tubers)
- Set of 5 of these were finally selected (usefully polymorphic and gave good, easily scored, products on the LI-COR)

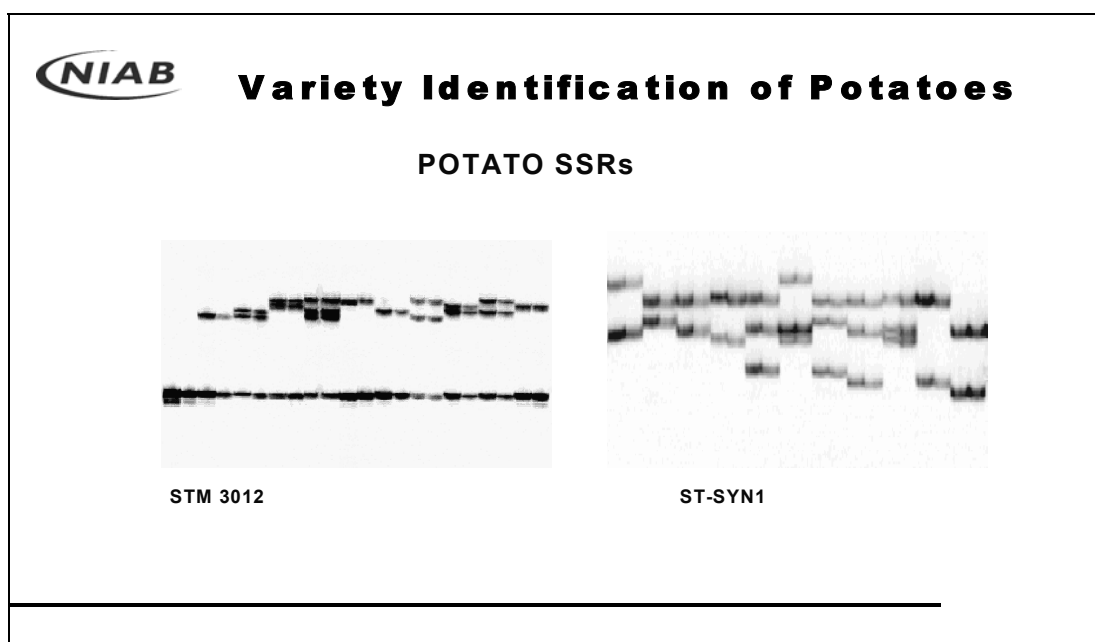
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 **Variety Identification of Potatoes**

**Potato SSRs**

Linkage Group	Locus	Repeat Motif	Predicted Size (bp)	Used in database
I	STM 2020	(TAA) <sub>6</sub>	162	Yes
II	STM 3018	(GA) <sub>9</sub>	168	
III	STM 1053	(TA) <sub>4</sub> (ATC) <sub>5</sub>	172	
IV	STM 3016	(GA) <sub>27</sub>	151	
V	STM 0013	(AC) <sub>23</sub> (AT) <sub>6</sub> (AG) <sub>9</sub>	195	
VII	STM 1100	(TA) <sub>22</sub>	173	
VIII	st-syn1	(ACTC) <sub>6</sub>	249	Yes
IX	STM 3012	(CT) <sub>4</sub> ...(CT) <sub>8</sub>	193	Yes
XI	STM 2005	(CTGTTG) <sub>3</sub>	166	Yes
XII	STM 2028	(TAC) <sub>5</sub> ...(TA) <sub>3</sub> .. (CAT) <sub>3</sub>	188	Yes

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**NIAB** **Variety Identification of Potatoes**

**Summary of data from analysis of 50 potato varieties using five microsatellite primer pairs.**

Linkage group	Locus	Total no. of bands*	No. of bands per variety	No. of different profiles*	Separation coefficient*
I	STM 2020	8	1-4	24	0.92
VIII	st-syn1	8	0-3	23	0.91
IX	STM 3012	5	1-4	11	0.84
XI	STM 2005	5	1-4	9	0.77
XII	STM 2028	7	1-5	19	0.86

\*from 50 varieties

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 **Variety Identification of Potatoes**


**Discrimination between potato varieties - combining data from SSR primer pairs.**

	Primer VIII			Primer IX			Primer XI			Primer XII		
	A	B	C	A	B	C	A	B	C	A	B	C
Primer I	16	47	<b>0.98</b>	13	40	<b>0.97</b>	13	39	<b>0.97</b>	15	45	<b>0.97</b>
Primer VIII	-	-	-	13	37	<b>0.97</b>	13	35	<b>0.96</b>	15	42	<b>0.97</b>
Primer IX	-	-	-	-	-	-	10	28	<b>0.94</b>	12	37	<b>0.95</b>
Primer XI	-	-	-	-	-	-	-	-	-	12	37	<b>0.96</b>

column A = number of bands; column B = number of unique DNA profiles (in 50 varieties); column C = separation coefficient

**100% discrimination possible by using primers I + VIII, plus any other one.**


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 **Variety Identification of Potatoes**

**Potato SSRs - Other Aspects:**

1. Same result from same sample (tuber and/or DNA extract) on different days	No problem
2. Effect of growing site/season	No problem
3. Uniformity – analysis of individual tubers (x10)	In some varieties (<10%), evidence of intra-varietal heterogeneity at one of the five SSR loci
4. “Blind” testing of authentic (reference) and retail samples	Reference samples – all correctly identified; Retail samples – evidence of some mis-labelling (4/13 cases)

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## **Variety Identification of Potatoes**

**CONCLUSIONS (1):**

- Use of a panel of SSRs provides a reliable method for potato variety identification
- Database production possible
- Further investigation of intra-varietal heterogeneity (uniformity) would be useful
- Analyse additional and new varieties
- Survey of potatoes in commerce

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## **Variety Identification of Potatoes**

**CONCLUSIONS (2):**

- This represents a “down-stream” application of SSRs – markers can be used throughout the production chain
- This also provides a model for variety authentication work (cf. protein electrophoresis in cereals)
- Will be increasing use made of markers for this kind of traceability/quality control work
- Variety registration processes should not be left behind

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