

Pyramiding nematode resistance and high O/L traits in elite peanut cultivars using marker assisted selection

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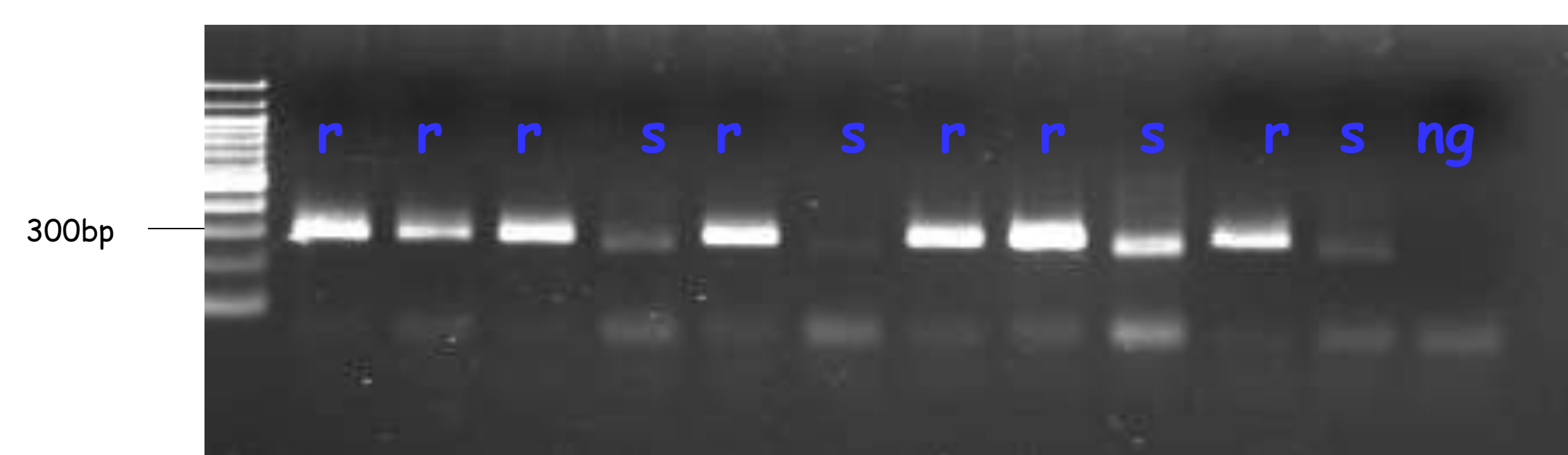
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Introduction

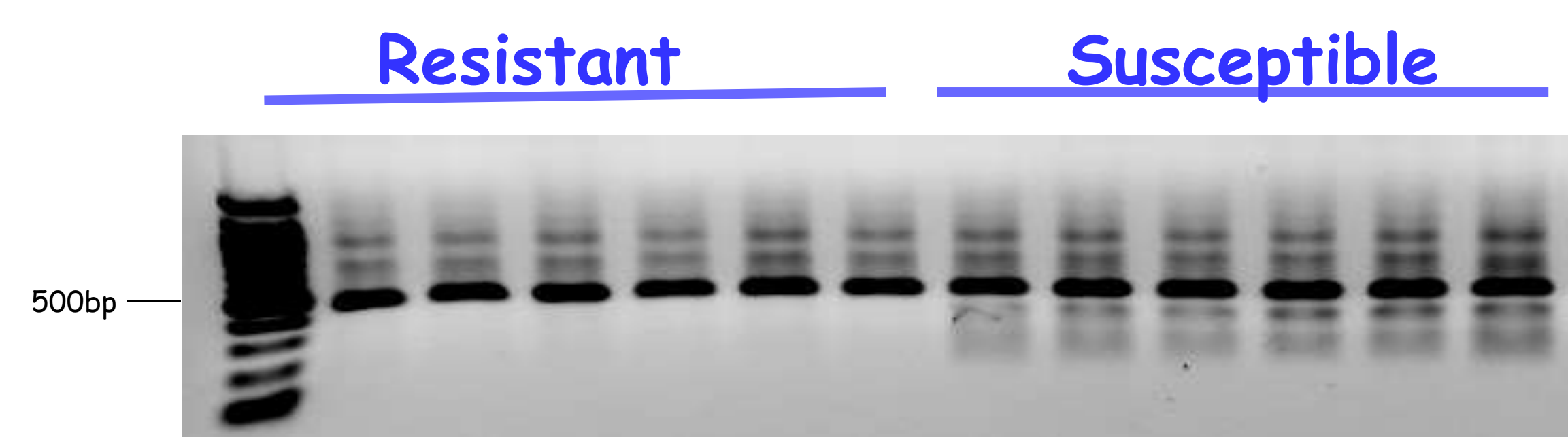
- Peanut breeding goal: **Resistance to Nematode & high O/L**
- Nematode in South Georgia causes millions of dollars loss annually
 - **Tifguard**
 - near immunity to nematode introgressed from *A. cardenasii*
 - tomato spotted wilt virus (TSWV) resistance
 - High oleic trait is desirable because of
 - Longer shelf life of peanut products due to oxidative stability
 - Health benefits such as decreased blood LDL and suppressed tumorigenesis
- **Georgia 02 C**
 - high O/L
 - TSWV resistance
 - *Cylindrocladium* black rot resistance
- **Florida-07**
 - high O/L
 - TSWV resistance
 - high yield

Genetic markers for nematode resistance trait

- 1. Dominant nematode resistant marker 909/197

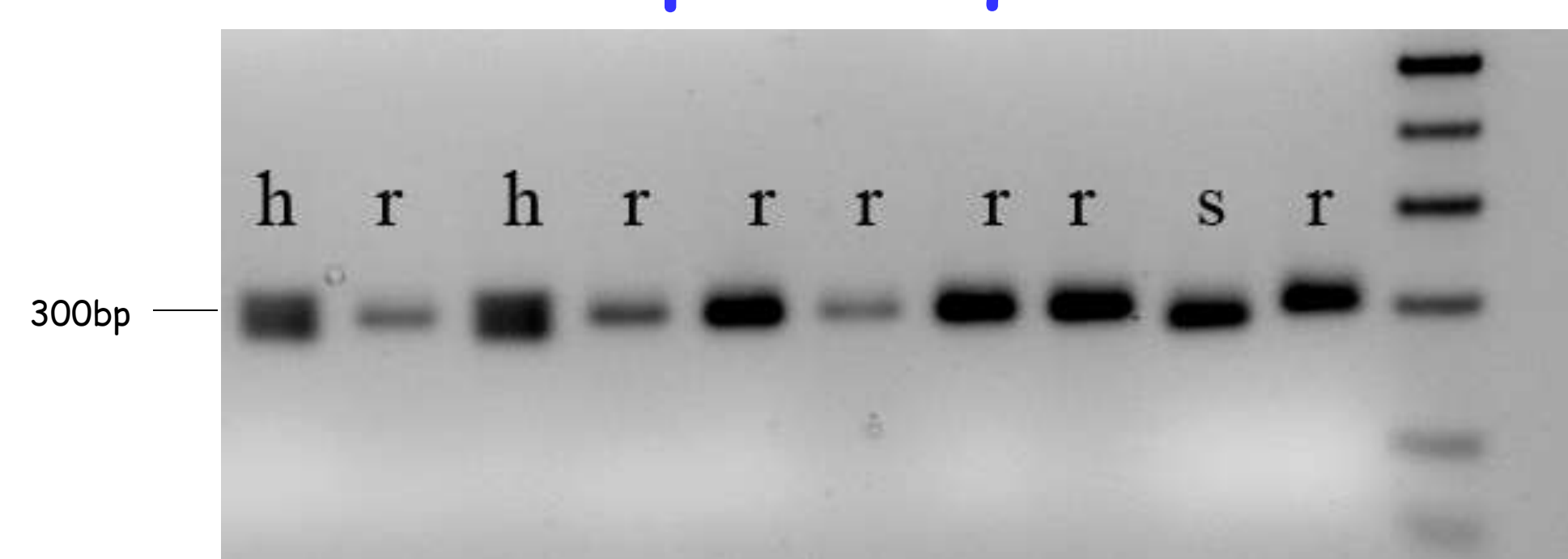


- 2. Dominant susceptible CAPS marker *ApoI*



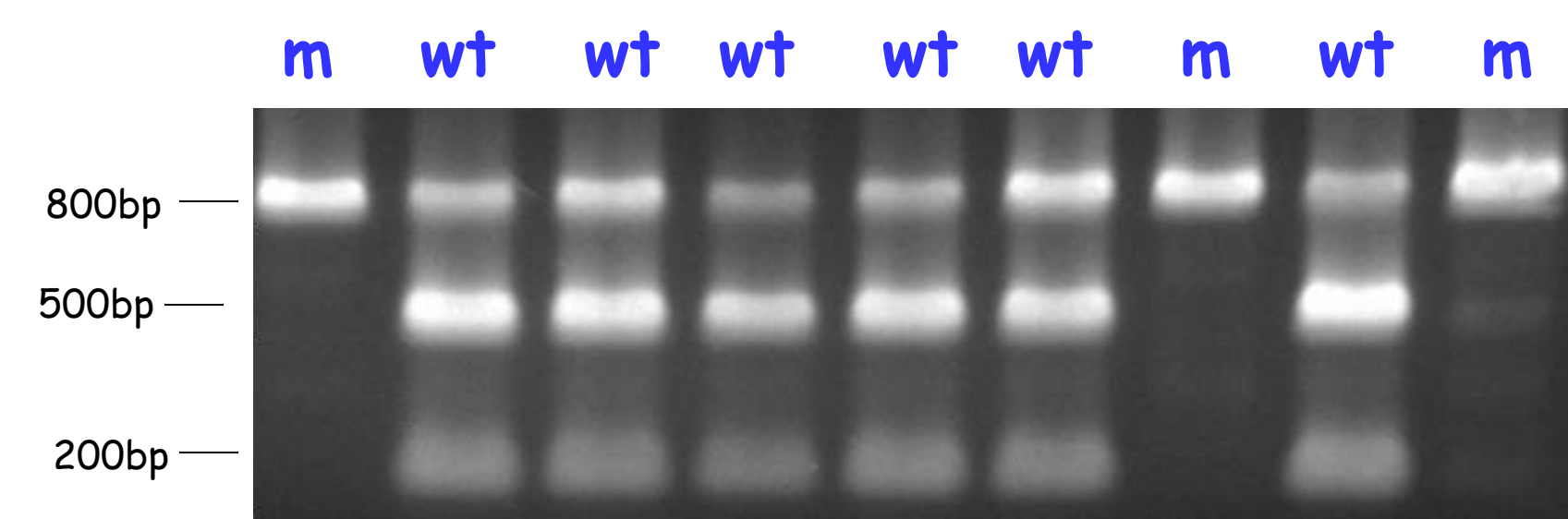
- 3. Co-dominant SSR marker (Nagy et al. Mol. Breed. in press)

pPGSseq17E3



Genetic markers for high O/L trait

- 1. CAPS marker *Hpy99I* for D150N transitional mutation in *ahFAD2A* allele



- 2. CAPS marker *Hpy188I* for A⁴⁴² insertional mutation in *ahFAD2B* allele

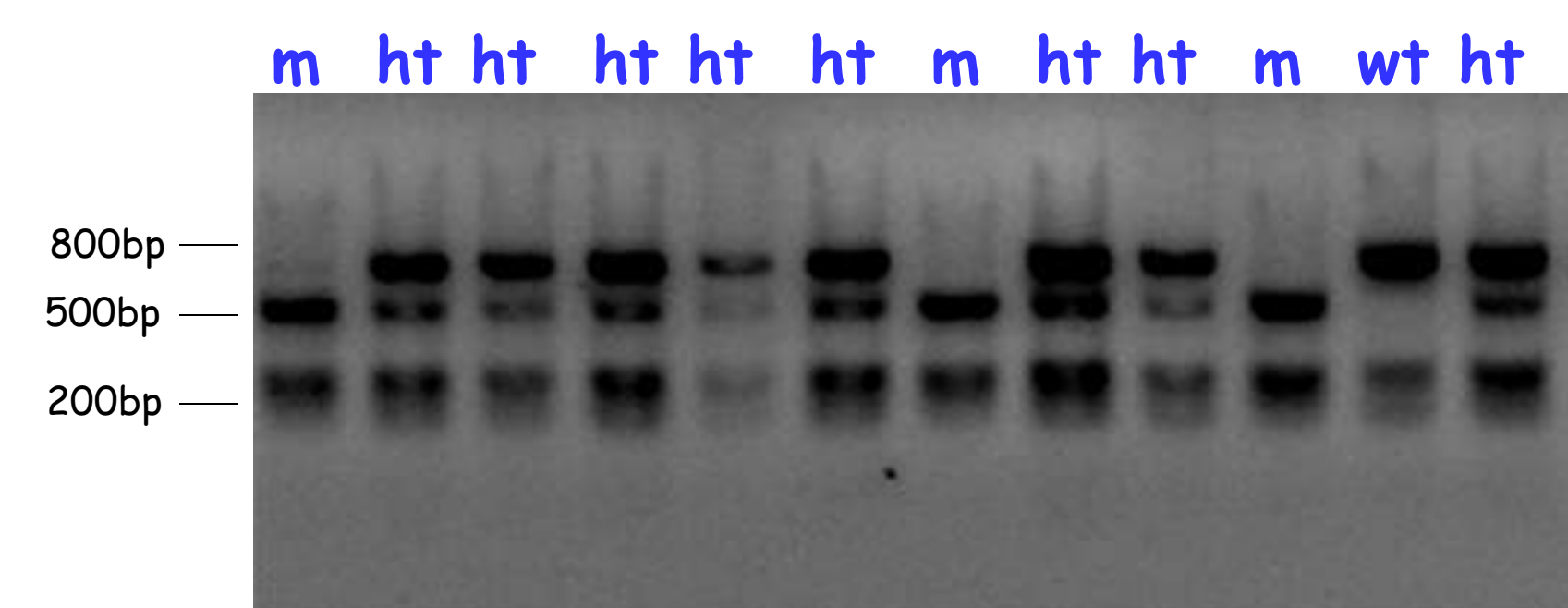
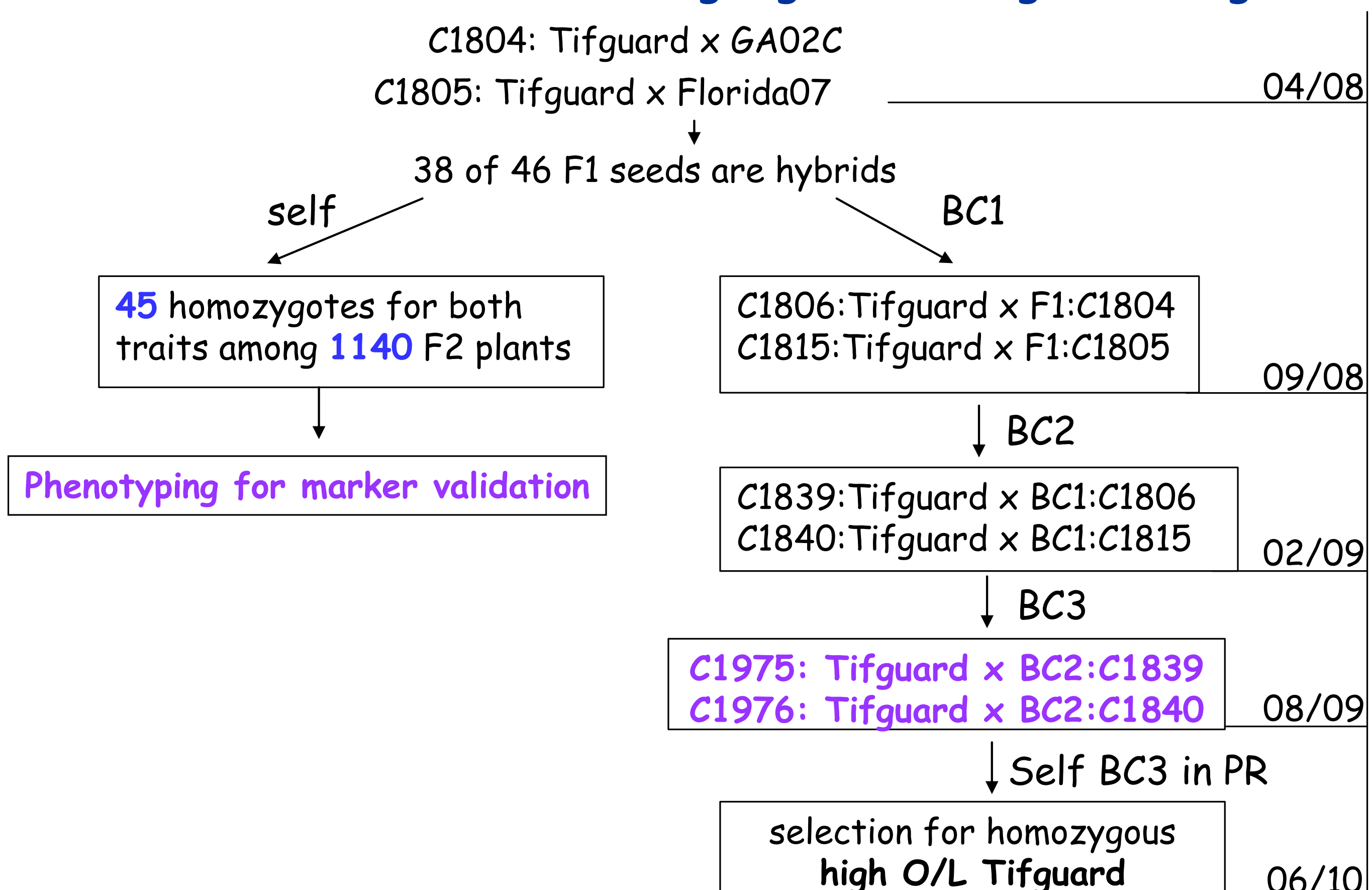


Chart 1. Time frame of breeding high oleic Tifguard using MAS



Conclusions

1. Molecular markers for both nematode resistance and high O/L traits are extensively applied in the current breeding project aimed at integrating these traits into a variety of elite peanut cultivars. Heterozygotes can be used for backcrossing.
2. Homozygotes for both traits can be detected as early as the F2 stage.
3. The time frame for obtaining high oleic Tifguard is expected to be 26 months by MAS instead of eight to ten years by traditional breeding.
4. Marker validation through phenotyping is currently under investigation.

Acknowledgement

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Table 1. Breeding project phase 2

Cross #	Female	Male	F1 plants	ideal F1	Ideal F1's traits combination
C1806	Tifguard	F1: Tifguard x Georgia 02C	8	4	O/L: Ht; NEMR: Hm
C1807	GA02C		1	0	
C1808	FLA07		6	1	O/L: Hm; NEMR: Ht
C1809	GA06G		10	2	O/L: Ht; NEMR: Ht
C1810	Georgia Greener		15	3	O/L: Ht; NEMR: Ht
C1811	AT3085RO		0	0	
C1812	GA03L		8	1	O/L: Ht; NEMR: Ht
C1813	Georganic		14	4	O/L: Ht; NEMR: Ht
C1814	Bailey Hi O/L		8	3	O/L: Hm; NEMR: Ht
C1815	Tifguard	F1: Tifguard x Florida 07	9	2	O/L: Ht; NEMR: Hm
C1816	GA02C		10	3	O/L: Hm; NEMR: Ht
C1817	FLA07		10	1	O/L: Hm; NEMR: Ht
C1818	GA06G		10	2	O/L: Ht; NEMR: Ht
C1819	Georgia Greener		14	4	O/L: Ht; NEMR: Ht
C1820	AT3085RO		0	0	
C1821	GA03L		11	1	O/L: Ht; NEMR: Ht
C1822	Georganic		10	2	O/L: Ht; NEMR: Ht
C1823	Bailey Hi O/L		6	2	O/L: Hm; NEMR: Ht
Total			150	35	

Table 2. Breeding project phase 3

Cross #	Female	Male	hybrid pegs	F1 plants	Ideal F1	Traits combination
C1939	Tifguard	F1: C1806: Tifguard x F1(Tifguard x GA 02C)	20	10	1	O/L: Ht; NEMR: Hm
C1940	Tifguard	F1: C1815: Tifguard x F1(Tifguard x FLA 07)	28	10	4	O/L: Ht; NEMR: Hm
C1942	FLA07	F1: C1817: FLA 07 x F1(Tifguard x FLA 07)	10			
C1943	FLA07	F1: 1808: FLA 07 x F1(Tifguard x GA 02C)	13			
C1944	GA06G	F1: 1809: GA 06G x F1(Tifguard x GA 02C)	25			
C1945	GA02C	F1: C1816: GA 02C x F1(Tifguard x FLA 07)	29			
C1946	GA06G	F1: C1818 GA 06G x F1(Tifguard x FLA 07)	28			
C1947	GeGreener	F1: C1810: Georgia Greener x F1(Tifguard x GA 02C)	20			
C1948	GA03L	F1: C1812: GA 03L x F1(Tifguard x GA 02C)	9			
C1949	Georganic	F1: C1813: Georganic x F1(Tifguard x GA 02C)	13	8	1	O/L: Ht; NEMR: Ht
C1950	Bailey H O/L	F1: C1814: Bailey H O/L x F1(Tifguard x FLA 07)	17			
C1951	GeGreener	F1: C1819: Georgia Greener x F1(Tifguard x FLA 07)	24			
C1952	GA03L	F1: C1821: GA 03L x F1(Tifguard x FLA 07)	15			
C1953	Georganic	F1: C1822: Georganic x F1(Tifguard x FLA 07)	13	8	1	O/L: Ht; NEMR: Ht
C1954	Bailey H O/L	F1: C1823: Bailey H O/L x F1(Tifguard x FLA 07)	9			
Total			273			

Table 3. Breeding project phase 4 expected harvest date : Dec. 24, 2009

Cross #	Female	Male	Wired peg #
C1975	Tifguard	F1: C1939: Tifguardx(Tifguardx(TifguardxGeorgia02C))	24
C1976	Tifguard	F1: C1940:Tifguardx(Tifguardx(TifguardxFL07))	38
C1977	Georganic	F1: C1949: Georganic x (Georganic x (TifguardxGA02C))	15
C1978	Georganic	F1: C1950: Georganic x (Georganic x (TifguardxFL07))	19