

Evaluation and Licensing Opportunities

For further information on this technology and evaluation / licensing opportunities please contact:

Dr Lars von Borcke
 lars@pbltechnology.com
 Tel: +44 (0)1603 456500

Tech ID: 10.508

Patent Literature

Publications: WO 2012/117256,
 US 2014/0150132 A1

Grants: AU 2012223022

High Oleic Acid Oilseed

Oil Seed Rape FAD2 Mutants with increased mono-unsaturated fatty acid content

Oleic acid is a mono-unsaturated omega-9 fatty acid present in various animals and vegetables. It is found in high concentrations in a range of vegetable oils, such as olive oil and peanut oil. It has various beneficial health properties and in addition has increased heat stability compared to polyunsaturated fatty acids, thereby making it attractive for use in processing. In vegetable oils it has been shown that high levels of oleic acid circumvents the need for hydrogenation (to increase the melting point and shelf life) which results in the creation of harmful trans fats. High oleic acid oils therefore deliver the properties sought by industry while retaining health benefits.

Oilseed breeding efforts have for many years focussed on increasing the oleic acid content, primarily by breeding varieties containing mutated alleles of the FAD2 gene. FAD2 (delta-12 oleate desaturase) catalyses the introduction of the second carbon bond into oleic acid and thereby producing polyunsaturated fatty acids). Leading commercial varieties (such as Cabriolet and V141) have an oleic acid content of around 70% to 80%, depending on environmental conditions.

Now Ian Bancroft and Rachel Wells at the John Innes Centre have been able to increase the oleic acid content in oil seed rape significantly beyond the level of current varieties. Their work has determined for the first time the precise number of alleles of the FAD2 gene found in oil seed rape. Through detailed genetic studies and sequencing they have found that there are four alleles of the FAD2 gene present in oilseed rape. Combined with their insights into the properties of each individual FAD2 allele they have been able to manipulate the optimal combination of FAD2 alleles in order to **obtain new oil-seed rape lines with oleic acid contents of up to 86%.**

The JIC team used EMS mutagenesis to generate numerous lines (including M0830, M0814 & M0814 listed in the table below) with improved oil profile (compared to best performing lines like Cabriolet (CAB) & V141), with the best lines showing an **increase of around 15% of oleic acid content** compared to the starting material, with an oleic acid content of over 86% and

	18:1	18:2	18:3	18:3/18:2	SAFA total	MUFA total	PUFA total
TAP	60.41	21.72	7.71	0.35	8.11	61.96	29.49
CAB	74.34	8.89	7.33	0.82	6.94	76.24	16.28
V141	82.00	5.86	2.86	0.49	6.70	84.01	8.76
M0830	86.42	1.80	2.83	1.57	6.17	88.51	4.63
M0814	85.50	2.06	3.33	1.62	6.19	87.49	5.43
M0814	85.30	2.35	3.66	1.56	6.31	87.08	6.01

crucially a total **poly-unsaturated fatty acid (PUFA) content of below 5%.** These lines, which have been protected by a patent application, are now available for incorporation into breeding programmes and will enable the establishment of very high oleic acid oilseed rape lines.

In summary:

- Oilseed rape breeding lines are now available, which have
 - Oleic acid content of up to 86%
 - PUFA content of less than 5%
 - Saturated fatty acid content of around 6%
- Genetic sequence and marker information for accelerated breeding and selection programmes.

Update

Germplasm from back cross 4 generation is available under licence agreements for further breeding