Bioscience Discovery, 11(3):175-177, July - 2020

Open Access, Peer Reviewed, Referred Research Journal

Print & Online available on https://jbsd.in
ISSN: 2229-3469 (Print); ISSN: 2231-024X (Online)

Research Article

Induced mutagenic variability in seed oil content of Sunflower (*Helianthus annuus* L.)

Vijeyata P Jamdhade & Navnath G. Kashid

Department of Botany, Baburaoji Adaskar Mahavidyalaya Kaij, Dist. Beed (MS) 431123,
Email: ngkashid@gmail.com

Article Info

Received: 01-04-2020
Revised: 11-06-2020
Accepted: 22-06-2020

Keywords: Seed oil content, mutagenic variability, sunflower.

Abstract

The main objective of this research was to increase genetic variability of sunflower in terms of oil content using induced mutations. Sunflower is an annual oil seed crop belongs to the family Asteraceae. Biochemical analysis from M_3 generation seed was carried out. There was a different type of mutant observed in two variety of sunflower namely Bhanu and SS-56 in all three mutagenic treatments are variability namely SA, EMS, & Gamma rays. In sunflower variety Bhanu it was observed that significant increase in seed oil content in Round Head Mutant (46.22%) compare with control. In variety SS-56 it was observed that highest seed oil content in Tall mutant (45.56%) compare to control. The present study was remarkably successful with respect to isolation of viable mutants some promising mutants were recovered which are rich in oil content.

INTRODUCTION

Sunflower botanically describes as *Helianthus annuus* L. herb with rough hairy items and broad leaves. Sunflower oil has been traditionally appreciated as a high-quality commodity in the world oil market (Fernandez-Martinez *et al*., 2009). Sunflower is the important source of vegetable oil, sunflower varieties contain from 39 to 40% oil. They seeds are 3rd largest source of vegetable oil worldwide, following soyabean and pulse (Encheva 2003).

Sunflower oil is premium oil because of its light in colour, bland flavor, high smoke, point and good nutritional quality oil from health point of view. Seed oils principally used for human consumption are comprised of five main fatty acids, the saturated palmitic (16:0) and stearic (18:0) acids, the monounsaturated oleic acid (18:1), and the polyunsaturated linoleic (18:2) and α-linolenic (18:3) acids. Due to presence of polyunsaturated fatty acids, which are known to reduce the risk of cardiac related problems (Monotti 2004; Iocca *et al*, 2016). Additionally, due to the possibility of using its oil as raw material for manufacturing biodiesel it is arousing the interest of farmers, agriculture professionals and companies in the world.

From the nutritional point of view, a diet rich in monounsaturated fatty acids has been suggested to reduce cholesterol in blood plasma, where is lowers low density lipoprotein but not high-density lipoprotein (Delpanque, 2000). Sunflower oil can be used in the manufacture of lacquers, copolymers, polyester films, modified resins and plasticizers. Emulsified and surfactants from sunflower oil are used in formulating pesticides (pryde and Rothfus, 1989)

MATERIALS AND METHOD In present study the experimental seed material of sunflower (*Helianthus annuus* L.) varieties namely

Bhanu & SS-56 obtained from dry Farming Research Station, Solapur 413002 (M.S.). The seeds were treated with chemical mutagens Ethyl Methane sulphonate (0.05%, 0.10%, and 0.15%); Sodium azide (0.01%, 0.02%, and 0.03%) concentrations & Gamma rays (10 kR, 20 kR, and 30 kR) dose. The different M_3 viable mutants seeds were practiced for estimation of oil content.

The seed oil contents were estimated by soxhlet method. The different mutants seeds crushed using mortar and pestle with petroleum hydrocarbon solvent transferring them washing to the thimble in the extractor. Continued the extraction for 4 hours then removed the extraction from its bath, look the extraction thimble. After it has drained out of the extractor and allowed to evaporate from it in current of air. Dried thimble and contents in over 105^{o} C, for 3 min.

The oil content was calculated by present weight.

$$\text{Oil present by weight} = \frac{W \times 100}{W}$$

Where:

W = Weight gm of the oil extracted.

W = Weight in gm of the sample taken for test.

RESULTS AND DISCUSSION

In sunflower variety Bhanu it was observed that significant increase in seed oil content. The seed oil content value ranged from 30.38 % to 46.22% as compared to control (31.09%) the lowest seed oil content values observed in Compact flower mutant (30.38%), while highest seed oil content values in Round head mutants (46.22%). The other mutants tall, dwarf, early maturity, late maturity, branched and twin head mutants observed increased seed oil content values compare to control values in variety Bhanu.

In sunflower variety SS-56, the seed oil content values ranged from 31.49% to 45.56%. All mutants tall, dwarf, compact flower, branched, early maturity, late maturity and twin head observed significant increase in seed oil content values as compared to control (31.49%). The highest seed oil content values observed in tall mutant (45.56%) in variety SS-56 of sunflower. Induced mutagenesis lead to genetically inherited variability of sunflower inbred lines in terms of oil content, which will be more suitable for use in breeding programmes.

Table 1: Seed oil content in viable mutants of *Helianthus annuus* L. Variety: Bhanu

Mutants	Mutant Type	Oil Content (%)
Control	-	31.09
B1	Tall	39.42
B2	Draft	36.2
B3	Compact Flower	30.38
B4	Branch Mutant	36.7
B5	Early Maturity	41.83
B8	Late Maturity	31.85
B9	Twin Head	33.7
K	Round Head	46.22

Table 2: Seed oil content in viable mutants of *Helianthus annuus* L. Variety: SS-56

Mutants	Mutant Type	Oil Content (%)
Control	-	31.49
A	Tall	45.56
B	Draft	41.38
C	Compact Flower	42.98
D	Branch Mutant	34.61
E	Early Maturity	40.61
F	Late Maturity	38.79
J	Twin Head	33.66
G	Round Head	34.9

REFERENCES

Deplanque, B, 2000. Interest nutritional des turnsoles, proc. 15th International Sunflower conference Toulouse (France). Tom I.B: 15-24.

Encheva J,christor M, Nenov N, Tsvetkova F, Ivanov P, Shindrova P. and Encheva V, 2003. Developing genetic variability in sunflower (*Helianthus annuus* L.) by combined use of hybridization with Gamma radiation or ultra sound. *Helia*, **26 (38):** 99-108.

Fernandez Martinez JM, Perez Vich B, Velasco L, 2009. Mutation breeding for oil quality improvement in sunflower. In: Shu Q. Y. (Ed.) Induced plant mutations in the genomic era. 177-182.

Iocca AFS, Dalchiavon FC, Malacarne BJ and carvalho CGPC, 2016. Content and oil productivity in sunflower genotypes produced in campo novo do parecis Mt, Brazil **19th** international sunflower conference Edirne, Jurkey. Pp:1136-1141.

Monotti M, 2004. Growing non-food sunflower in dry and conditions, *Italian Journal of Agronomy* (**I):**3-8.

Pryde EH, and Rothfus JA, 1989. Industrial and nonfood uses of vegetable oils. In: Robbelen, G, Downey RK, Ashri A. (Eds), Oil crops of the world: Their Breeding and utilization. MC Graw-Hill, NY, USA, PP.87-117.

How to cite this article

Vijeyata P Jamdhade & Navnath G. Kashid, 2020. Induced mutagenic variability in seed oil content of Sunflower (*Helianthus annuus* L.). *Bioscience Discovery*, **11**(3):175-177.

Google Scholar citation: https://scholar.google.co.in/citations?user=vPzEyC8AAAAJ&hl=en