SCREENING OF SUNFLOWER VARIETIES FOR CONFECTIONERY GRADE

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Abstract

Twenty sunflower varieties/genotypes were screened for confectionery grade based on the seed characters, biochemical characters, viz., total sugars, reducing and non-reducing sugars, chlorogenic acid and oil content. The fatty acid profile of a few selected genotypes was studied. Based on the above studies, sunflower accessions were identified as confectionery grade sunflower.

Introduction

Sunflower is one of the important annual crops of the world grown for edible and nutritious oil. There are two types of sunflower, the oilseed type and non-oil or confectionery type. The latter type represents less than 10 percent of the total sunflower production. In developed countries, confectionery type sunflower seeds are consumed as whole roasted seeds and the kernels are sold as products which are widely enjoyed owing to their pronounced flavor, crunchy texture, high protein, low oil (low FFA value) and high sucrose contents. Though sunflower seed production in this country has been registering a steady growth, there is a lack of confectionery grade seeds. There is a great demand in domestic and overseas markets for confectionery grade sunflower characterized by bold, striped seeds, high oleic acid and low chlorogenic acid contents. Hence there is a need to screen the existing genotypes suitable for confectionery and to increase the production.

Materials and Methods

Ten sunflower genotypes, viz., Acc. No. 1439, 136, 179, 914, 916, 1128, 1142, 1149, 1168 and TUB 346 obtained from the Directorate of Oilseeds Research, Hyderabad and ten genotypes obtained from University of Agricultural Sciences, Bangalore, viz., UAS-43, 377-1-1, 1174-1-2, 1258-1-1-B, TS 39-9, EC 376211, EC 376240 (Black), EC 376240 and Surya 11 were screened for confectionery grade.

Seed Characters. Ten sunflower genotypes were analyzed for seed characters such as 100-seed weight, kernel and hull percentage, K/H ratio and whole seed oil percentage. The variety MSFH 17 was used as a check (Table 1).

Table 1. Seed characters and oil percentage of certain sunflower genotypes.

Sunflower accessions/ genotypes	100-seed weight (g)	Kernel (%)	Hull (%)	K/H ratio	Oil content (%)
ACC 1439	6.530	61.19	38.81	1.58	31.77
ACC 136	6.198	73.08	26.92	2.71	29.88
TUB 346	5.796	67.19	32.84	2.05	29.41
ACC 179	6.370	66.15	33.85	1.95	30.77
ACC 914	5.098	58.46	41.54	1.41	28.63
ACC 1168	6.602	44.44	55.55	0.08	22.79
ACC 1149	6.422	65.51	34.48	1.90	26.01
ACC 916	3.418	76.74	23.26	3.30	28.04
ACC 1128	5.764	68.35	31.65	2.16	30.47
ACC 1142	6.194	54.43	45.56	1.19	24.12
Surya -11	4.170	72.90	27.10	2.69	36.12
EC 376240	4.40	68.27	32.27	2.07	37.48
EC 376240 (black)	7.80	58.33	41.66	1.40	41.51
EC 376211	6.23	69.02	30.98	2.23	28.56
TS 39-9	6.32	70.89	29.11	2.43	24.09
1426-1-1-1	5.17	62.48	37.52	1.66	39.09
1258-1-1-B	5.12	57.03	42.97	1.33	48.66
1174-1-1-2	4.29	58.04	41.96	1.38	40.22
377-1-1	3.95	62.03	37.97	1.62	28.77
UAS-43	7.80	48.46	51.54	0.94	23.83
MSFH 17	6.37	70.00	30.00	1.42	29.67

Biochemical Characters of Sunflower Seeds. The seeds of the twenty sunflower genotypes were defatted. The total sugars were estimated by the Anthrone method (Hedge and Hofreiter, 1962). The reducing sugars were estimated by the Nelson-Somogyi method (1952). For the non-reducing sugars, sucrose was determined from the total sugars and the non-reducing sugar estimate. The phenolic compound, chlorogenic acid, was determined by the method of Eskin et al. (1978) (Table 2).

Fatty Acid Profile. The fatty acid profile of selected sunflower genotypes with low oil content was analyzed using a 10% DEGS column after converting to methyl esters (Munshi, 1987) (Table 3).

Table 2. Biochemical characteristics of certain sunflower genotypes.

Sunflower accessions/ genotypes	Total sugar (%)	Reducing sugar (%)	Non reducing sugar (%)	Chlorogenic acid (%)
ACC 1439	9.00	1.12	7.88	2.17
ACC 136	11.80	0.88	10.92	2.42
TUB 346	8.50	1.00	7.50	2.41
ACC 179	10.90	1.15	9.75	2.59
ACC 914	8.91	1.25	7.66	3.38
ACC 1168	9.27	1.02	8.25	2.03
ACC 1149	20.82	0.88	19.94	2.75
ACC 916	8.90	1.38	7.52	2.62
ACC 1128	10.91	0.95	9.96	2.15
ACC 1142	6.91	1.05	5.86	1.86
Surya -11	8.45	0.99	7.46	1.95
EC 376240	9.23	1.42	7.81	1.98
EC 376240 (black)	9.70	1.67	8.03	2.05
EC 376211	12.15	1.22	10.93	1.92
TS 39-9	8.95	1.56	7.39	2.16
1426-1-1-1	11.12	1.43	9.69	2.43
1258-1-1-B	8.65	1.23	7.42	2.52
1174-1-1-2	7.32	1.05	6.27	2.07
377-1-1	9.05	0.95	8.10	2.37
UAS-43	11.82	1.08	10.74	2.59
MSFH 17	15.42	1.64	13.78	1.71

Results and Discussion

Confectionery grade sunflower is characteristically bold-seeded with high kernel weight and low oil content. Of the twenty genotypes, ACC 1149 and 136 recorded high kernel weight. ACC 916 recorded the highest kernel percentage of 76.74% and the highest K/H ratio of 3.30. ACC 1168 recorded the lowest oil content of 22.79% followed by 377-1-1. Confectionery grade seeds are marked by high sucrose (non-reducing sugar) content.

Chlorogenic acid is a phenolic compound that limits the acceptability of sunflower seeds. Of the twenty sunflower entries, ACC 1142 recorded the least chlorogenic acid content next to the check MSFH-17.

Fatty Acid Profile. The fatty acid profile of selected sunflower genotypes with low oil content was analyzed using a 10% DEGS column after converting to methyl esters (Munshi, 1987) (Table 3).

Table 3. Fatty acid profile of certain sunflower genotypes.

Genotypes / accessions	Palmitic acid	Stearic acid	Oleic acid	Linoleic acid
ACC 1439	7.48	1.72	34.04	56.76
ACC 136	6.00	1.85	52.00	40.60
TUB 346	6.54	1.60	43.63	48.23
ACC 179	6.26	1.71	44.35	47.68
ACC 914	7.30	1.73	41.06	49.82
ACC 1168	5.65	1.50	48.22	44.79
ACC 1149	5.81	1.46	46.27	46.44
ACC 916	6.18	1.50	42.93	49.37
ACC 1128	5.47	1.61	42.44	50.49
ACC 1142	5.74	1.65	39.87	52.71
MSFH 17	7.09	1.40	45.67	45.90
Surya 11	7.17	1.40	36.61	54.71
EC 376211	5.29	1.75	43.40	49.46
TS 39-9	7.85	1.50	41.06	49.52
377-1-1	5.68	1.41	47.16	45.75
UAS 43	7.00	4.70	44.60	43.70

The fatty acid profile indicated that the monounsaturated fatty acid, oleic acid, and the polyunsaturated fatty acid, linoleic acid, together constitute more than 90 percent of fatty

acids and the remaining 10% was made up of saturated fatty acids in the sunflower genotypes. Linoleic acid was the highest concentration varying from 40.60 to 56.76%. Oleic acid, the next major fatty acid ranged from 34.04 to 52.00%. The saturated fatty acid, palmitic acid ranged from 0.59 to 1.31%. The sunflower genotype ACC 136 recorded the highest oleic acid content of 52%. From the biochemical screening, ACC 136 has been identified as suitable confectionery type sunflower.

References

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