

**RECENT RESULTS FROM THE GUYANA
VARIETY DEVELOPMENT
PROGRAMME USING QUALITY AS A
SELECTION CRITERION IN STAGE I**

BY

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INTRODUCTION

- **The success of any sugarcane breeding programme is dependent on the effectiveness of the process of variety selection - long and expensive**
- **Early selection methods relied mainly on visual characteristics of the seedling population with no attention being paid to sucrose content**
- **Recent constraints of sugar production in the Caribbean led to the development of a special high sucrose parental population at WISCBS. These parents are now being used in commercial breeding programmes and their progeny are being evaluated across the region including Guyana**

- **In Guyana, sugarcane is grown on the coastland where climatic conditions are not very suited for natural cane ripening**
 - the annual rainfall averages about 1980 mm
 - daily temperature ranges between 31°C and 22°C
 - relative humidity is about 80%
- **These constraints coupled with the need to develop new improved high sucrose varieties, have inspired the ARC to embrace a new strategy of ‘quality evaluation’ for at the initial stage of variety evaluation**
- **Progenies from the Demerara Series (D) and the Demerara-Barbados Series (DB) crossing programmes are evaluated each year**

- **The variety selection process commences with the evaluation of a large number of seedlings (derived from “true seed”) in Stage I**
- **Traditionally, selections are made in the 1st ratoon cycle, using visual assessment of clones, which are compared with the standard commercial variety**
- **In the advanced stages of evaluation, clones are selected for yield and quality characteristics, resistance to diseases and other beneficial agronomic characteristics**

MATERIALS AND METHOD

- **The family assessment exercise was conducted in four experimental fields at the ARC over a two year period**
- **35 families from the D2004 Series, 157 from the DB2004 Series and 77 from the DB2005 Series were assessed**
- **Approximately 40 seedlings from each family, along with the standard commercial variety DB7869 were planted in observation plots (The larger population was planted simultaneously in another section of the field)**
- **The seedlings were planted in-field at 60 cm (2 feet) intervals in a single row with rows spaced 1.5 m (5') apart in a ridge and furrow layout**
- **A single stool of the standard variety separated the various families of canes**

- **Each seedling was hand-brixed at the time of harvest (age 46 to 53 weeks) of the plant crop. Juice was taken from 3 stalks within each stool, at the fifth internode from the LVD leaf and brix readings determined using a hand held refractometer**
- **The mean brix value for each family was then compared to that of the commercial standard. Families, which exhibited Brix values $> 19.5^{\circ}$ in the D Series population and $> 20^{\circ}$ in the DB population were identified for further assessment**
- **Approximately 7 to 9 months post harvest of the plant crop, selections were made in the entire population using traditional visual methods**

RESULTS AND DISCUSSIONS

Table1: FIELD BRIX VALUES FOR THE D 2005 FAMILIES

Code #	Parents	Mean family brix	Range of family brixes	% selection to stage II
6004	WI79492 * POLY	14.1	8.0 - 22.4	2.3
6007	WI79492 * POLY	15.0	10.5 - 19.8	0.7
3029	D 89290 * POLY	17.8	11.3 - 21.7	2.9
7052	D 96291 * POLY	17.9	9.8 - 21.8	7.2
7070	D 9044 * POLY	18.1	12.9 - 23.4	6.3
6005	WI76403 * POLY	18.2	12.6 - 21.8	1
3018	D 89349 * POLY	18.2	14.3 - 24.1	2.1
7082	D 93409 * POLY	18.3	13.8 - 22.6	0.5
3027	D 8026 * POLY	18.3	12.5 - 22.9	1.2
7085	D 8976 * POLY	18.5	13.2 - 22.4	0.5
7083	D 93224 * POLY	18.7	10.0 - 22.8	0.5
7049	D 9044 * POLY	19.1	13.4 - 22.0	3.5
7010	D 8976 * POLY	19.2	11.7 - 23.0	6.9
7067	D 91175 * POLY	19.5	16.2 - 22.2	3.6
3026	DB9314 * POLY	19.7	15.2 - 23.6	1
7071	DB79327 * POLY	19.7	12.8 - 26.4	4.5
7026	DB89186 * POLY	19.8	12.5 - 23.2	1.8
6003	WI79535 * POLY	19.9	14.4 - 23.6	0.2
7078	D 7078 * POLY	19.9	12.6 - 27.3	1.4
7035	D 8976 * POLY	19.9	14.3 - 24.5	4.9
7030	D 8691 * POLY	20.1	11.3 - 24.2	4.1
7073	D 9119 * POLY	20.1	13.9 - 23.2	4.3
7036	D 9086 * POLY	20.1	15.1 - 23.9	4.4

Table 2: DB2004 Families with mean Brixes > 20° and/or selection rates > 10 %

Code #	Parents	Mean family brix	Range of family brixes	% Selection
632	D 9083 * Polycc	17.9	9.8 - 22.2	15.0
874	B 89640 * Polycc	18.1	14.1 - 22.8	14.0
871	D 89262 * Polycc	18.7	11.8 - 23.7	16.9
641	DB8935 * Polycc	18.9	17.2 - 21.9	11.7
872	DB8958 * Polycc	19.2	12.9 - 23.3	15.5
887	B 85342 * PolyMPc	19.3	13.5 - 23.2	14.2
750	DB8958 * Polycc	19.7	16.1 - 23.1	10.0
877	R 570 * Pilycc	19.8	18.0 - 22.8	14.9
911	DB88175 * Polycc	19.9	14.0 - 22.3	11.7
809	B 85342 * Polycc	20.0	14.8 - 23.8	3.6
950	DB88175 * Polycc	20.1	16.6 - 22.8	11.8
949	DB8958 * Polycc	20.2	15.7 - 25.7	7.9
939	D 8415 * Polycc	20.3	17.9 - 23.2	0.0
878	D 8928 * Polycc	20.3	15.6 - 23.7	16.7
943	D 8928 * Polycc	20.3	11.6 - 22.8	17.3
12	B 85342 * WI79461	20.4	13.8 - 23.8	4.9
863	WI9101 * Polycc	20.5	14.4 - 23.5	3.9
655	B 78436 * Polycc	20.5	16.0 - 23.2	5.3
944	DB88112 * Polycc	20.5	14.4 - 24.7	15.7
92	B 85342 * B 74612	20.6	15.2 - 23.4	4.8
488	R 570 * Polycc	20.6	16.8 - 22.4	7.2
724	BT84118 * Polycc	20.6	13.0 - 24.4	15.7
910	DB8755 * Polycc	20.7	17.3 - 23.2	31.8
661	B 97263 * Polycc	20.8	15.2 - 25.3	7.6
649	B 89491 * Polycc	20.8	16.9 - 24.7	9.0
956	B 881104 * Polycc	20.9	17.4 - 23.4	10.8
651	B 9356 * Polycc	21.2	15.2 - 24.6	14.4
966	uk	21.3	17.7 - 23.7	8.2
879	D 9083 * Polycc	21.4	13.7 - 24.5	20.7
947	DB87141 * Polycc	21.5	15.4 - 25.4	4.5
849	B 89640 * B 89529	21.5	16.2 - 24.0	6.5
664	B 85342 * Polycc	21.6	15.8 - 24.6	3.8
883	B 85342 * Polycc	21.6	19.0 - 24.2	17.4
646	B 031549 * Polycc	22.1	20.2 - 23.4	3.5
905	B 89640 * Polycc	22.2	18.1 - 24.9	6.2
492	WI96916 * PolyMPc	23.0	20.0 - 25.6	1.6

Figure1. Mean brix values of the families from the DB2004 Series

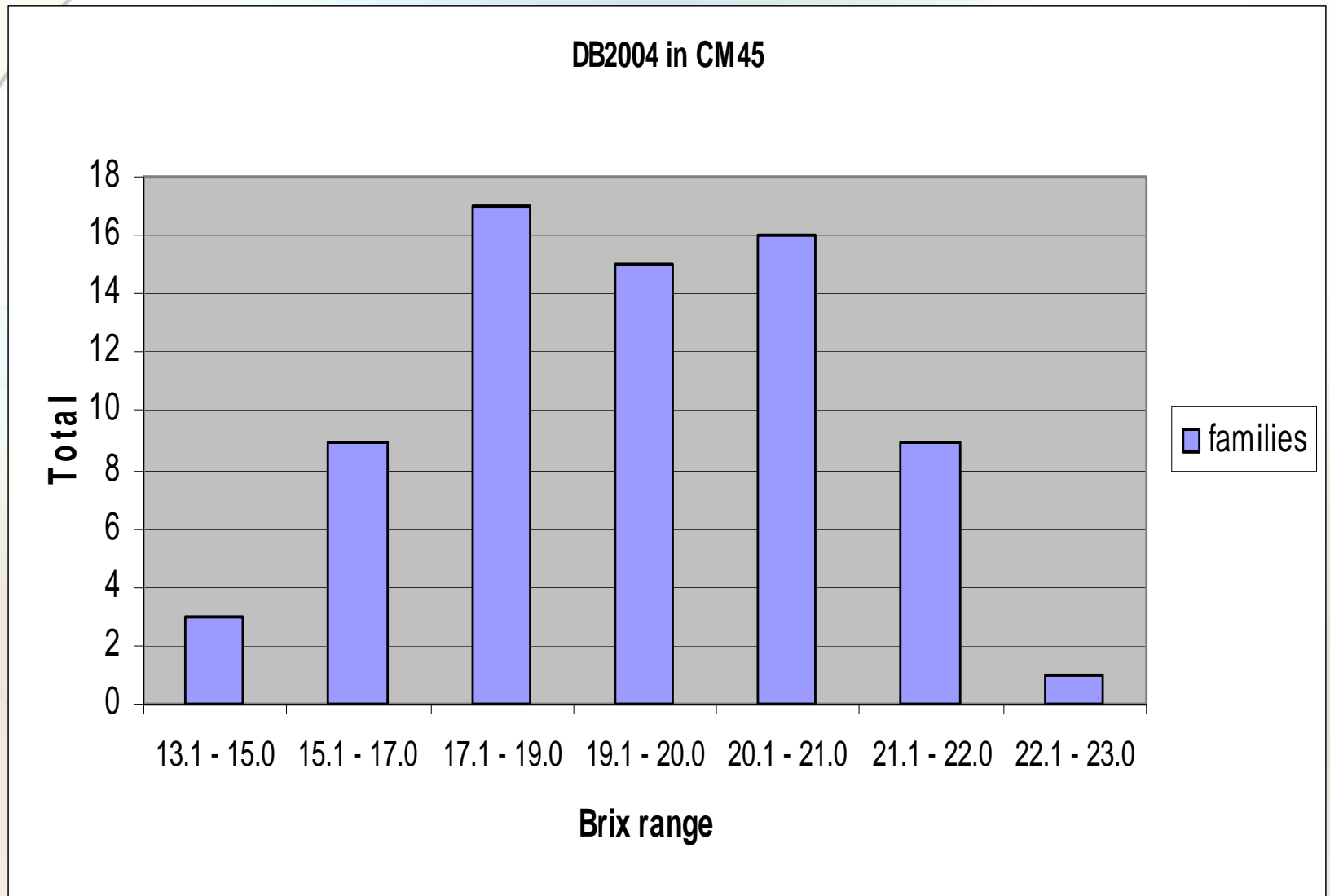


Figure 2. Mean Brix values of the DB2004 Families in CM63

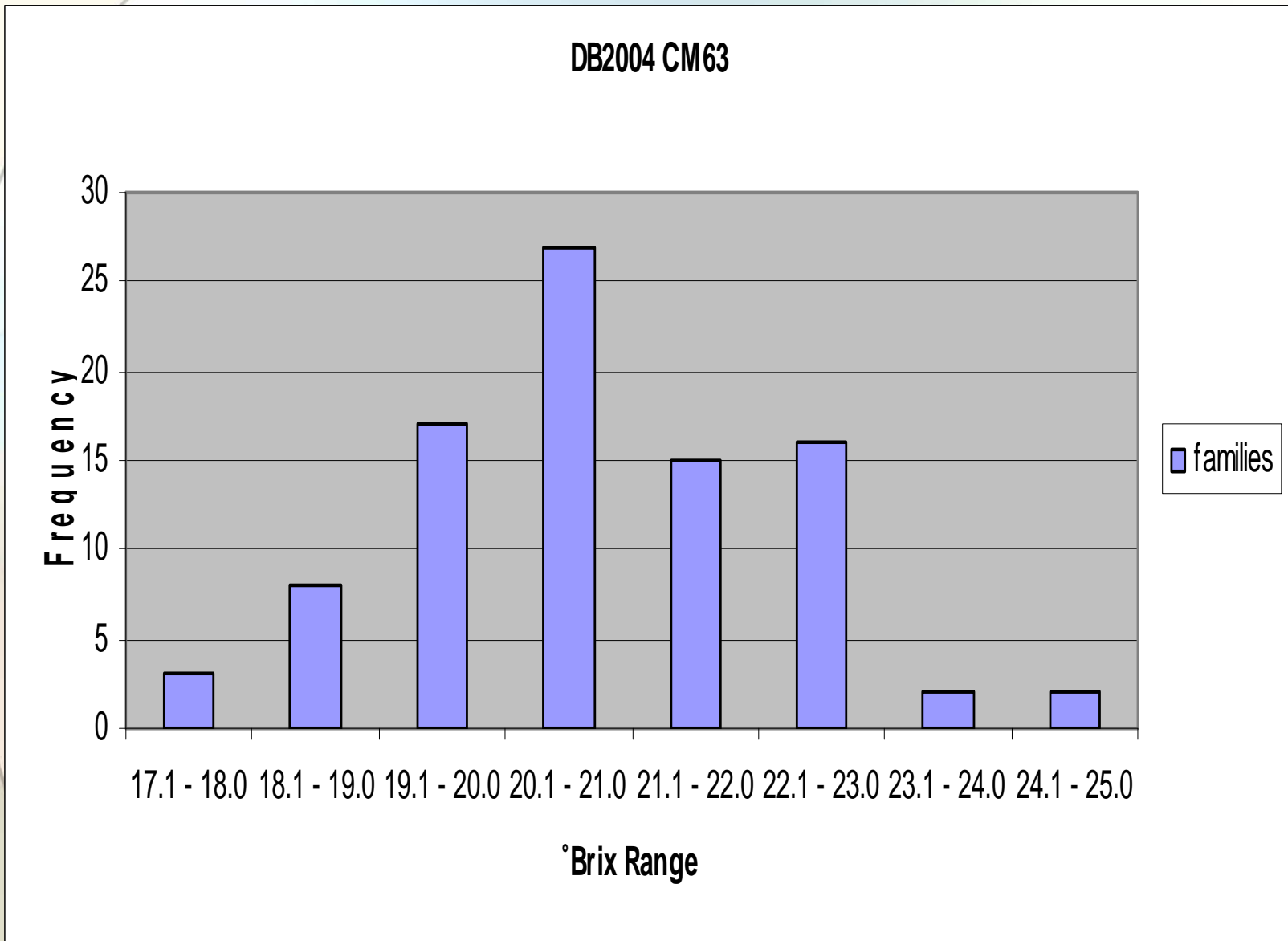


Figure 3. Mean Brix values of the Families from the DB2005 Series

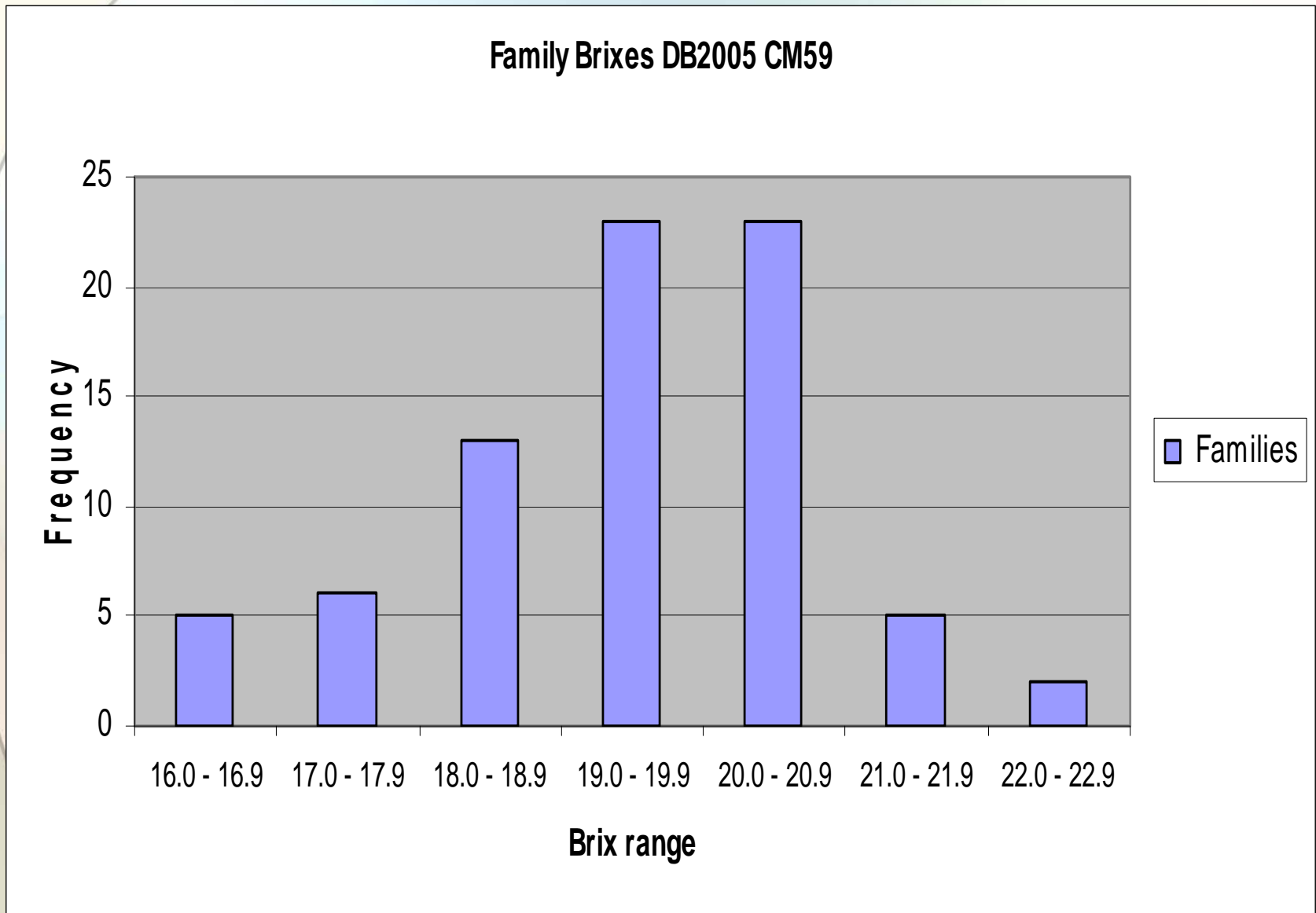


Figure 4. Families with seedlings showing Brix values >23.0°

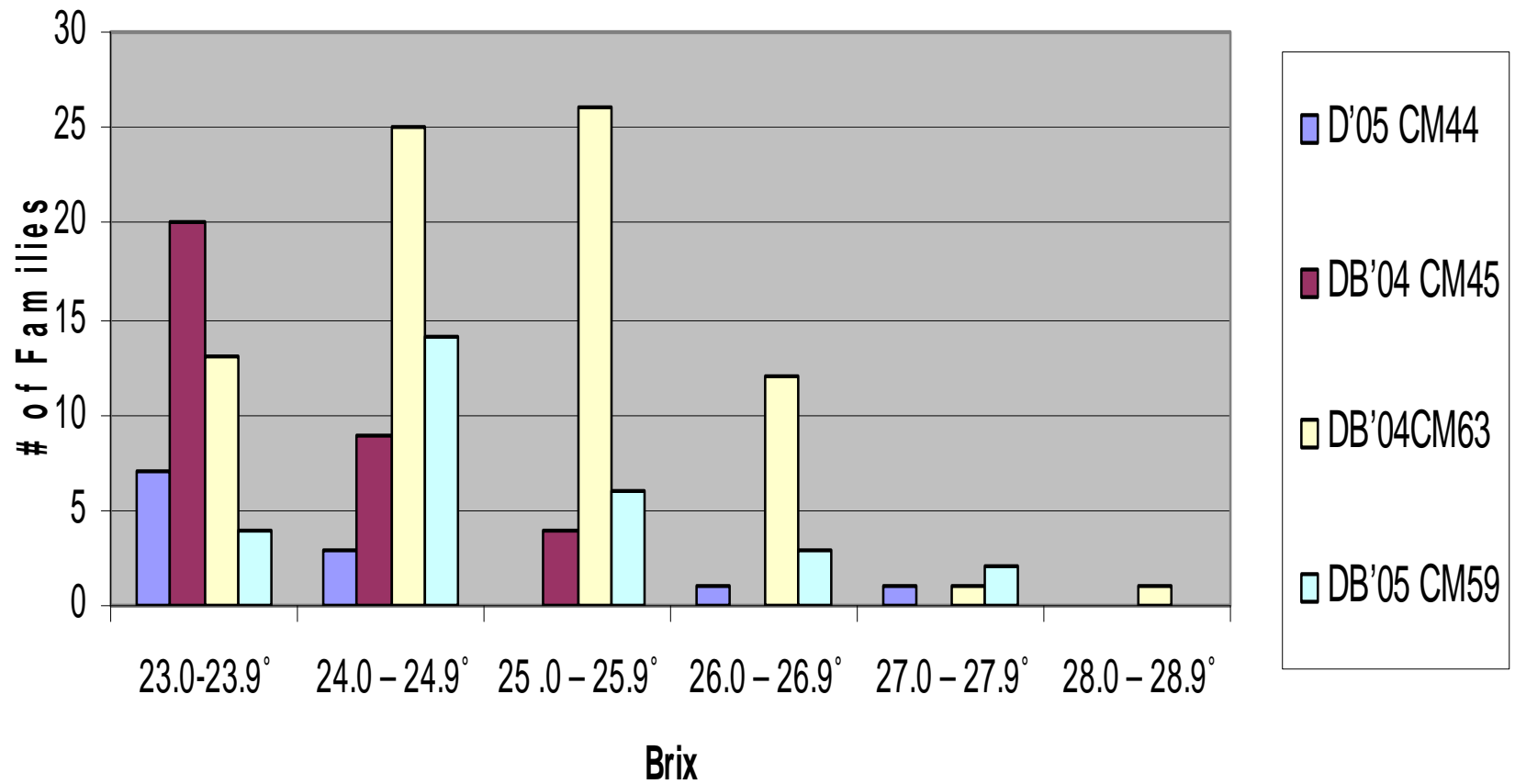
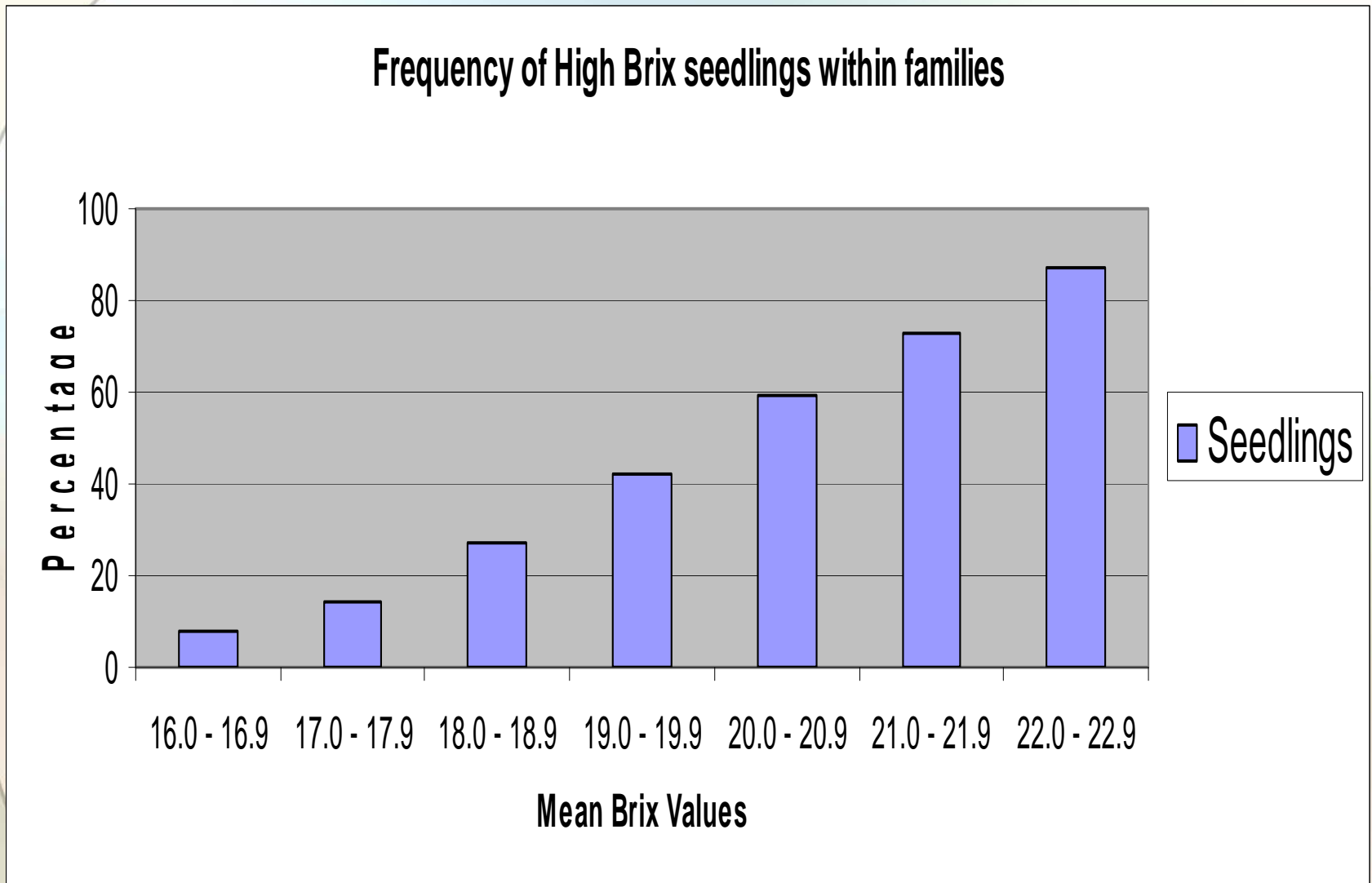


Figure 5. Frequency of "High Brix" seedlings within families



CONCLUSION

- **Testing of genotypes singly at the seedling stage will improve the effectiveness of the selection process**
- **Family selection, when properly established can be an effective tool for identifying quality families early, eliminating the expenditure of time and resources to evaluate the poor families.**
- **The gross weight of the family plots will further improve the effectiveness of this process.**