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THE DEGREE OF CROSSABILITY OF BREAD WHEAT LANDRACES FROM NORTHERN AFRICA WITH RYE

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SUMMARY

The degree of crossability of bread wheat landraces from northern Africa with rye is determined. The landraces from Canary Islands, Morocco, Mali, Sahara, Nigeria and Chad have a low crossability. From Tunisia eastwards some landraces with a moderate crossability are found in addition to those with a poor crossability. These are likely related to the landraces from Saudi Arabia, Iraq and Iran.

1. INTRODUCTION

Various studies on the geographical distribution of the degree of crossability of bread wheat landraces with rye have been carried out. These studies concern bread wheat landraces of Eurasia. No information is yet available on the degree of crossability of bread wheat from Africa. To fill this gap in our knowledge the crossability of 291 landraces of bread wheat, originating from Africa north of the tropics was investigated.

2. MATERIAL AND METHODS

Seeds of the 291 landraces came direct or indirect from various countries of northern Africa. They have been grown and regrown in our collection for several years and crossing work covered the period 1970 to 1984. Of each variety at least 100 florets were emasculated before flowering and pollinated with fresh pollen of rye (mainly from cv. Rogo). To prevent illegitimate crossing the ears were bagged. After harvest the number of grains were counted and each grain was scored for possible hybrid origin (small shrunken grains) or for selfed origin (plump seeds). After 2–3 months, to avoid trouble with dormancy, the grains were germinated to identify the colour of the coleoptile. Most wheats had green coleoptiles while rye had in general purple coleoptiles. Purple (presence of anthocyanins) is dominant over green.

The grains were sown in petridishes and after germination the dishes were placed under lamps to induce anthocyanin production. In general there was a close association between F_1 seed score and purple coleoptile colour, and S_1 seed score and green coleoptile. Some wheats have purple coleoptiles too, and

Table 1. Degree of crossability of African wheat landraces with rye.

	Crossability (%)					
Country/Region	0–5	6–10	11–30	31–50	>50	Total
Can. Islands	16(100)	0	0	0	0	16
Morocco	80(100)	0	0	0	0	80
Mali	8(100)	0	0	0	0	8
Nigeria	80(99)	0	1(1)	0	0	81
Chad	7(100)	0	0	0	0	7
Sahara	12(100)	0	0	0	0	12
Tunisia	24(80)	3(10)	3(10)	0	0	30
Lybia	22(67)	4(12)	7(21)	0	0	33
Egypt	10(77)	2(15)	1(8)	0	0	13
Sudan	1(25)	1(25)	1(25)	0	1(25)	4
Ethiopia	6(86)	0	1(14)	0	0	7

could therefore not be checked in the above way. Owing to the good association between coleoptile colour and origin of wheat the seeds obtained of the few landraces with purple coleoptile were classified according to their appearance. Non-germinating seeds were scored as F_1 seeds.

In each year the good crossing Chinese Spring wheat was taken as a control.

3. RESULTS AND DISCUSSION

The results are presented in *table 1*. In this table the countries have been listed roughly from west to east. The results show that wheats from the western part of northern Africa (Canary Islands, Morocco, Mali, Nigeria, Chad and Sahara) have a poor crossability. There are some wheats in the eastern part of northern Africa (Tunisia, Lybia and Egypt) which have a moderate crossability. The few wheats of Sudan have a crossability ranging from poor to very good. More wheats should be tested from this country and from Ethiopia to give better information on their crossability.

RILEY & CHAPMAN (1967) mentioned association between crossability genotype and crossability. Their conclusion is given in *table 2*.

If this association is accepted then almost all wheats from the western part of northern Africa have the genotype Kr1Kr1Kr2Kr2. In the eastern part wheats with the genotype Kr1Kr1kr2kr2 and/or kr1kr1Kr2Kr2 are found. In Sudan

Table 2. Association between crossability genotype and crossability (RILEY & CHAPMAN 1967)

Genotype	Crossability
Kr1Kr1Kr2Kr2	0– 5
Kr1Kr1kr2kr2	10–30
kr1kr1Kr2Kr2	31–50
kr1kr1kr2kr2	> 50

one variety carries kr1kr1kr2kr2. MEISTER (1928), KROLOW (1970) and own research data indicated that in Iran the crossability of bread wheat ranges from poor to good. We have found two good crossing wheats in Iraq and Saudi Arabia. From these data we conclude that the wheats of the eastern part of northern Africa form a transition between the wheats of the eastern side of the Red Sea and those of the western part of northern Africa. There is no relationship between crossability and the genotype of hybrid necrosis. Therefore ZEVEN's (1980) suggestion that the non-carrier wheats have derived from the wheats that migrate along the north coast of Africa to enter the formerly wet Sahara and the Ne_1^m carrying wheats derive from the wheats that entered Africa by crossing the Red Sea and migrating through the Sudan zone could not be confirmed by the results of the crossability of these wheats.

ZEVEN (1974) suggested that some Northern Nigerian wheats derive from introductions from the former British India in approximately 1930–1940. These could not be detected by their degree of crossability as Indian wheats have also a low crossability (RIGIN, 1964; own investigations).

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