GENETICS OF INDUCED GRAIN MUTANTS IN HEXAPLOID TRITICALE

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TRITICALE (X triticeosecale Wittmack), an amphiploid of wheat and rye, is the first man-made cereal with greater sink capacity (no. of spikelets/spike), seedling vigour, tolerance to unfavourable conditions and superior grain quality than wheat. One of its major problems is grain shirrelling, which is mainly responsible for its unpopularity despite its superior nutritional quality1-3.

Several mutants affecting plant, spike and grain were induced and recovered in the hexaploid triticle strain DTS 330. Out of these mutants two grain shape mutants, were used for genetic analysis of mutant traits. The present study was undertaken to understand the number of genes involved in these mutations, the degree of dominance of the normal genes in relation to their mutant alleles and the pleiotropic effects of the mutant genes, if any.

The two grain mutants (figure 1) with different degree of grain shirrelling i.e. more shirrelled long grain mutant and less shirrelled small seeded mutant were crossed to control DTS 330 reciprocally. Phenotypes of the grains were recorded in F₁ and in F₂ generation segregation for the normal and mutant traits was recorded. The quality of the fit for observed segregating frequencies was calculated by the $\chi^2$ test.

Forty F₁'s were obtained from the reciprocal crosses of control DTS 330 with more shirrelled long grain mutant and the phenotype of all the F₁'s was of control grain type suggesting the dominance of normal allele over mutant and the absence of cytoplasmic influence. In the F₂ generation, 1004 control grain type and 297 long grain mutant type were observed, gave the segregation ratio 3 normal: 1 mutant with the $\chi^2$ value of 3.22, suggested that more shirrelled long grain mutant trait is under the control of single gene. Reciprocal crosses of control DTS 330 with less shirrellelled small seeded mutant gave 75 F₁'s and all of them were of control grain type suggesting the dominance of normal allele over mutant and the absence of cytoplasmic influence. In the F₂ generation, 2110 were of control grain type and 672 were of less shirrelled small seeded mutant grain type which gave the segregation ratio as 3 normal: 1 mutant with the $\chi^2$ value of 1.05, suggested that less shirrelled small seeded mutant trait is under the control of single recessive gene.

In conclusion, more shirrelled long grain mutant and less shirrelled small seeded mutant traits are under the control of single genes. Further, both these grain mutants can be exploited in understanding the biochemical basis of grain shrivelling in triticle.

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OCCURRENCE OF OCELLAR LAMPROPHYRES IN THE SETTUPALLE ALKALINE PLUTON, PRAKASAM DISTRICT, ANDHRA PRADESH

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THE silica-saturated Settupalle (16°01'N–79°52'E) alkaline pluton1 is situated between the two nepheline syenite plutons at Elchuru2 and Purimetla3 in the "Prakasam alkaline province" of Andhra Pradesh4-5. The Settupalle pluton is predominantly composed of
quartz syenites and hornblende syenites, with subordinate amounts of fayalite syenites, and insignificant amounts of nepheline syenites. The occurrence of ocellar lamprophyres in the Purimetla pluton has prompted the authors to search for similar dykes in the Setupalle pluton and these attempts succeeded.

The lamprophyres are of restricted distribution in the quartz syenites, and are located north of the Setupalle village. Among the 3 dykes encountered in the area, one trends NE–SW, and the other two trend NW–SE; their strike length ranges from 50 m to 75 m, and the width does not exceed 2 m. The trends of lamprophyres are coincident with the two sets of joint patterns prevalent in the area. The contact between quartz syenites and lamprophyres is presumed to be sharp.

White-coloured, spherical, rounded and irregular shaped conspicuous ocelli (1 to 5 mm diameter) are seen to occur along the central portions of the dykes; the contact between ocelli and fine-grained dyke matrix is fairly sharp (figure 1). The appearance of pitted weathered surface of one of the lamprophyres suggests the removal of ocelli in solution.

The Setupalle lamprophyre dyke rocks are fine- to medium-grained, compact, heavy and dark-coloured. In thin section, they exhibit typical porphyritic/pseudomorphic texture which is defined by intensely zoned phenocrystic titanaugite (with occasional phenocrystic olivine) set in a groundmass of plagioclase, biotite, calcite and minor K-feldspar. Olivine is generally pseudomorphosed into opaques. Accessories include apatite, analcite and opaques. On the basis of classification given by Rock and Streckeisen, the lamprophyres of Setupalle fall in the camptonitic group.

Clinopyroxene (titanaugite) phenocrysts (2 to 5 mm long) are ubiquitous in the lamprophyres. It occasionally carries inclusions of coarse-grained olivine and fine-grained biotite. It is zoned and moderately pleochroic with X = light pinkish brown, Y = pale brown, and Z = brownish yellow. The mineral rarely occurs in clusters and exhibits frequent deuteric alteration. Olivine occurs occasionally as phenocrysts as well as inclusions in clinopyroxene, and range in length from 2 to 3 mm. It is highly pseudomorphosed (in some sections), and occasionally alters to reddish iddingsite and greenish bowlingite. Primary biotite occurs as small flaky groundmass and ranges in size from 0.5 to 1 mm. It is strongly pleochroic with X = yellowish brown, and Y = Z = reddish brown colours. It also occurs as rims around ocelli (figure 2); this feature is similar to that exhibited by the ocellar lamprophyres of Western Otago, New Zealand wherein kearsutite rims around ocelli are suggestive of reduction in vapour phase associated with the minerals and late stage crystallization of core of ocelli than the rim of ocelli.

Plagioclase is found both as matrix and ocelli. It occurs as small lath-shaped crystals and exhibits lamellar twinning. In ocelli, plagioclase contains inclusions of calcite, rarely K-feldspar and analcite.

Ocelli of lamprophyres are composed of K-feldspar, plagioclase, calcite and analcite (figure 2). K-feldspar

Figure 1. Hand specimen of the Setupalle lamprophyre conspicuously showing white ocelli in a black matrix. The scale is in cm. 2. The ocellar texture of the Setupalle lamprophyre. Note the dark coloured biotite rims around the ocelli. Crossed nicols × 45.
occurs as interstitial grains in association with plagioclase. Calcite occurs as inclusions in plagioclase; it is polysynthetically twinned and frequently exhibits twinning. Small rounded grains of apatite are generally associated with plagioclase. Colourless to pale buff masses of very fine grained analcime occur in ocelli.

The main characteristics of the Settupalle occellar lamprophyres are, in general, common with those of similar dykes the world over. There are differences of opinion on the origin of ocelli. In lamprophyres it is attributed to the process of liquid immiscibility (as in the case of Callandar Bay of Ontario and of the Monterigian Province of Quebec) or to the segregation of residual liquids (as in the case of Western Otago of New Zealand). At Settupalle, the lack of plagioclase phenocrysts, the abundance of mafic phenocrysts and the hydroxyl mafic phases in the lamprophyres reflect the water-rich environment during magmatic crystallization. The occurrence of leucocratic ocelli in them is akin to the liquid immiscibility between a silicate melt and a melt relatively rich in H₂O and CO₂ (evidenced by the presence of abundant biotite in groundmass and carbonate in both groundmass and ocelli). The presence of ocelli and deuteric alteration of clinopyroxene suggest retention, at least in part, of magmatic volatile constituents.

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NEWS

NEW STAGE OF DEVELOPMENT OF SOVIET IRON AND STEEL INDUSTRY

Soviet iron and steel industry, faces a new stage of technological rejuvenation. The very structure of steel-smelting production has been radically changing in favour of converter and electric furnace technologies. In 1986–1990, steel production by the continuous casting method will grow not less than two times over.

The range of products has also been expanded from steel plates and 1.5-metre pipes to a micron-thick steel band. There is also a drive to improve the quality of metal.

The new stage of iron and steel industry development will be initiated by the start of high-tech projects now under construction, such as the Oskol Electrometallurgical Plant. Steel is produced here not of cast iron but of polletised metal, specially treated iron-ore primaries. This technology drops the blast-furnace stage and does not require costly coke.

The draft Guidelines for the Economic and Social Development of the USSR for 1986–1990 and for the Period Ending in the Year 2000 set a wide range of important economic tasks before the Soviet iron and steel industry. It will have to expand the production of pipes for oil, gas and other projects with high corrosion-resistant properties and metalware and to start the serial production of not less than 500 types of rolled stock articles. (Soviet Features, Vol. XXV, No. 32, February 23, 1986; Information Dept., USSR Embassy in India, P.B. 241, Barakhamba Road, New Delhi 110001).