Letters to the Editor

Pai (Marathwada University), for useful discussion.
Department of Botany, Bir Bahadur.
Post Graduate Centre,
Osmania University,
Warangal 506 009, August 7, 1975.

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OCURRENCE OF TYPES WITH CHARACTERS
OF ORYZA GLABERRIMA IN ASSAM
RICE COLLECTION

Character association leading to sub-species and
species formation as a concept, is known in rice.
Characteristic features of the japonicas (considered
a sub-species of Oryza sativa) have been mentioned
by Nagai (1959). Swaminathan et al. (1968) had
suggested that disruptive selection leading to con-
stellation of characters was a force in sub-species
development in O. sativa. In the varieties belonging
to the African cultivated species, the common
features include short and truncate ligule, unbranched
panicle habit, glabrous hull and leaf in general,
(with exceptions), red kernel and absence of peren-
nating habit (Seetharaman, 1962). While a few of
these features are also possessed by many of the
indica varieties, forms with short and truncate
ligule and unbranched panicle were never observed
in indica varieties. The occurrence of such varieties
is now reported.

The Assam Rice Collection (ARC) consisting of
7000 varieties, collected from Assam and other areas
in N.E. India by Swaminathan and his colleagues
was transferred for maintenance to the Central Rice
Research Institute in 1972. During the course of
observation, six entries had some of the distinguishing
features of O. glaberrima (Table I).

The varieties resemble the glaberrimas in
(i) having short truncate ligule, (ii) the absence
of secondary branches in the panicle (with rare excep-
tion) and (iii) having glabrous hull with red kernel.
Red kernel and glabrous hull are also to be seen
in the varieties belonging to O. sativa.

Occurrence of short ligule and panicles without
(or rare) secondary branches in cultivars from India
had not been reported earlier and is of significance.
In mutation and hybridization studies carried out by
Ratho (unpublished thesis) in the two species
(O. sativa and O. glaberrima), it was reported
that these two characters remained together. It
is an example of parallel evolution through muta-
tion in the forms belonging to the two cultivated
species. It may, therefore, be inferred that the genes
for panicle habit and nature of ligule are separate
but are situated close together. It is a case of close
linkage rather than pleiotropy.

<table>
<thead>
<tr>
<th>ARC No.</th>
<th>Height (cm)</th>
<th>Spikelets/pa. (l.o.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>6186</td>
<td>84</td>
<td>40</td>
</tr>
<tr>
<td>6187</td>
<td>74</td>
<td>22</td>
</tr>
<tr>
<td>6189</td>
<td>82</td>
<td>34</td>
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<td>6191</td>
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<td>29</td>
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<tr>
<td>6192</td>
<td>92</td>
<td>38</td>
</tr>
<tr>
<td>6200</td>
<td>81</td>
<td>29</td>
</tr>
</tbody>
</table>
| Oryza gla-
ber-
rima | 95          | 50                  |

The authors are thankful to Dr. S. Y. Padmanabhan, Director, for his suggestions.

Genetics Division, R. Seetharaman,
Central Rice Research D. P. Ghoral
Institute,
Cutack 753 006, Orissa,
August 8, 1975.

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Culture, Yokendo Press, Tokyo, 1959.
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A NOTE ON THE EMBRYOLOGY OF
LIPOCARPA SPHACELATA KUNTH
(CYPERACEAE)

The earlier embryological investigations of the
genus Lipocarpus have been concerned only with
the development of embryo² 4, L. chinensis (O.b.)
Kern (L. argentea R. Br.) and L. sphacelata
Kunth (L. tropae Nees) have been recorded from
South India¹. The present investigation deals with
the development of the male and female gameto-
spores, endosperm and embryo in L. sphacelata

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*Lipocarpha sphaecula* is a glabrous herb with tufted stems bearing several dark-purple spikelets grouped in terminal bracteate "heads". The flowers are bisexual each with 2 hypogynous scales, within which there are 2 stamens and a tricarpellary gynoecium. The ovary is unilocular with a basal ovule (Fig. 7).

One or two hypodermal archesporial cells are differentiated in each lobe of the 4-lobed young anther as seen in transsection. They divide periclinally forming an inner primary sporogenous layer and an outer primary parietal layer (Fig. 1). The latter by further periclinal and anticlinal divisions forms an endothecium, a middle layer and a part of the tapetum (Fig. 2). The remaining part of the tapetum is derived from the cells of the connective adjacent to the sporogenous cells. Thus the tapetum is of dual origin. As the anther development proceeds, the middle layer degenerates and the cells of the endothecium develop thickenings (Figs. 3, 6). The tapetum is of the glandular type and its cells remain uninucleate throughout, and later degenerate. Ubisch bodies are observed along the inner side of the tapetum (Fig. 3).

The primary sporogenous cells divide and the products of the last division form the microspore mother cells. Each microspore mother cell undergoes meiosis and forms 4 nuclei of which 3 occupy the wallward position while the fourth remains in the center (Fig. 4). The cytokinesis is of the simultaneous type resulting in the formation of a tetrad (Fig. 5). The latter consists of 3 small non-functional microspores which later degenerate *in situ* and a large functional microspore which develops into a pollen grain. The pollen grains have a thick exine and a thin intine, and are 3-celled when shed (Fig. 6).

The ovule is anatropous, biteminal and crassinucellar. Some of the funicular cells elongate and later cover the outer opening of the micropyle to form an obturator (Fig. 7). After fertilization, a group of cells at the chalazal region become thick-walled and form a hypostase (Fig. 14).

A single archesporial cell is differentiated in the ovule primordium and divides forming an outer primary parietal cell and an inner sporogenous cell (Fig. 8). The former divides and forms a 3- or 4-layered parietal tissue. The sporogenous cell functions as the megaspore mother cell (Fig. 9). The megaspore mother cell undergoes meiosis and usually forms a linear tetrad of megaspores; occasionally a T-shaped tetrad is observed (Fig. 10).
The chalazal megaspore functions while the other 3 degenerate. The nucleus of the functional megaspore undergoes 3 successive divisions and forms 2-, 4- and 8-nucleate embryo sac of the Polygonum type (Fig. 7, 11, 12). The organized embryo sac has an egg apparatus, 2 polar nuclei and 3 antipodal cells (Fig. 12). The polar nuclei fuse in the center of the embryo sac to form the secondary nucleus (Fig. 13).

Fertilization is porogamous. Syngamy and triple fusion take place resulting in the formation of the zygote and the primary endosperm nucleus respectively. The first division of the primary endosperm nucleus is not followed by wall formation. Free-nuclear divisions take place in the endosperm until about 120 nuclei are produced. Then centripetal wall formation sets in and ultimately the endosperm becomes cellular (Fig. 14). The zygote divides transversely forming a terminal cell ca and a basal cell cb (Fig. 15). The former undergoes 2 vertical divisions one at right angles to the other and forms a quadrant q (Figs. 16, 17). The cell cb divides transversely forming 2 superposed cells m and ci. The cells of quadrant divide by oblique walls delimiting the protoderm from an inner group of cells (Fig. 18). The embryo development conforms to the Juncus variation of the Onagrad type and the disposition of different regions in the mature embryo corresponds to the Cyperus type.

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Bangalore 560 001, July 18, 1975.


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A NOTE ON THE INDUCED VARIATIONS IN CHILLIES

The crop improvement work done hitherto was by selection and hybridisation in chillies. Success achieved in evolving improved varieties in other crop plants in recent years, prompted the use of induced mutagenesis in the genetic improvement of chillies. Physical and chemical mutagens, namely, gamma rays, X-rays and ethyl methane sulphonate (EMS) were used on two local varieties of chillies, mundu and sattur samba.

Gamma irradiation was done using 2000 Curie 60Co gamma cell. X-irradiation was done from Philips C. T. apparatus operated at 50 kV without filter at a distance of 4 cm from the source, the dose rate being 500 R per minute. The doses of gamma rays and X-rays employed were 10 to 60 kR with a stepwise interval of 10 kR. The seeds pre-soaked in distilled water for 6 hours were treated with six different concentrations of aqueous EMS (20 to 70 mM) for 4 hours. For each dose 100 seeds were treated and M1 population was raised. In the present note a few of the morphological variations noticed in M1 in both the varieties are described.

The untreated seedlings of mundu show apical dominance and alternate phyllotaxy. One of the seedlings at 10 kR of X-irradiated M1 population showed suppression of apical dominance and branching at the early seedling stage while the other showed three cotyledonary leaves. One of the M1 plants of mundu at 40 mM of EMS treatment showed the occurrence of aerial roots in the basal portions of the stems which were not observed in the control. The flowers borne on the untreated plants have five petals. The number of stamens in the flowers are equal to those of petals. However, among the 65 M1 plants, treated with gamma rays (30 kR) five showed variations in the number of petals and anthers ranging from 4 to 7.

The untreated plants of sattur samba possess 4-6 primary branches on the mainstem. The mutant identified in 50 mM of EMS treated M1 plants exhibited unicuslum with the suppression of primary branches. In the six out of 59 M1 plants of sattur samba treated with 40 mM of EMS, some of the flowers had larger number of petals and with more than one ovary although the majority showed normal flowers. The fruits developed from these abnormal flowers showed variations in size. Rarely, on the same pedicel 1 or 2 extremely small fruits with varying size could be seen. The phenotypic changes noticed in the M1 showed the effect of mutagens on chillies.

The writer is grateful to Dr. C. V. Govindaswamy, Dean, Dr. P. Chandrasekharan, Professor of Botany, for providing necessary facilities.

Agricultural College R. SITTRA PATTI RAMALINGAM
and Research Institute,
Madurai, August 2, 1975.