CYTOLOGICAL AND GENETICAL STUDIES OF THE
INTERSPECIFIC CROSS OF THE CULTIVATED
FOXTAIL MILLET, SETARIA ITALICA (L.)
BEAUV., AND THE GREEN FOXTAIL
MILLET, S. VIRIDIS L.¹

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The cultivated foxtail millet, Setaria italica, is extensively grown
in the Far East, notably in China and India. Its wild relative,
the green foxtail, S. viridis, which is a native of the old world ac-
cording to Piper (6),¹ differs from the cultivated forms in many
respects, such as growth habit, plant height, seed shattering, etc.
The distribution of the green foxtails in China, from Manchuria to
Southwest China, is in close association with the cultivated form.
That is to say, wherever the cultivated form is seen, inevitably the
wild form also can be found. Both forms furthermore, have nine
pairs of chromosomes. In short, they are, in many respects highly
related. It is, therefore, of much interest to determine their relation-
ships cytologically and genetically.

MATERIAL AND METHODS

A number of attempts have been made to hybridize these two species arti-
cially but without success. In 1938, hybridization again was tried on a large
scale and a number of supposedly hybrid seeds were obtained. However, only
one plant among all those grown proved to be a hybrid. The S. italica was the
female parent of this cross. The hybrid plant was grown carefully in an earthen
pot. The heads were bagged to avoid cross pollination. Nevertheless, some seeds
from unbagged flowers were grown and were sown in order to increase the size of
the F₂ population.

Some 4,000 seeds were sown in wooden flats in the greenhouse, but only half
of these germinated. When the seedlings reached a height of about 1 inch, they
were transplanted to the field, being set 2 inches apart. The final population
of the F₂ generation was 1,250 plants. Careful records were undertaken on each plant
from time to time, both in the field and in the laboratory.

In the F₂ generation, 100 lines were grown in order to verify the F₂ ratios. The
final population of each line was 45 to 185 plants, but a majority had more than
100 plants. About 78 lines were carefully studied, while the other 22 lines were
discarded because of lack of time for detailed study.

For cytological study of the pollen mother cells, the heads were fixed in acetic-
 alcohol (1 part glacial acetic acid and 3 parts absolute alcohol). After about 24
hours, they were transferred from the fixative to 90% alcohol where they remained
for 1 or 2 days and then they were preserved in 70% alcohol. The aceto-car-
mine smear method was used exclusively.

Iodine-potassium iodide was used as a stain in pollen analysis.

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³Figures in parenthesis refer to "Literature Cited", p. 54.