

A SEARCH FOR NITROGEN FIXATION MUTANTS OF PEA

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Mutants of pea that cannot fix N_2 in symbiosis with Rhizobium are valuable for studies of the physiology and genetics of symbiotic nitrogen fixation, even though they may not be useful in plant breeding. Nitrogen fixation mutants are now being investigated in several laboratories (1, 2, 3).

'Finale' (Cebeco, Rotterdam) was chosen for study because of its stable yields and wide adaptation in many countries. It is a dwarf, white flowered cultivar with large, round, green seeds and very easy to handle in growth chambers.

One or 1.5 kg lots of seeds were treated with mutagens (ethyl methanesulphonate, sodium azide, N-ethyl-N-nitroso urea, and diethyl sulphate). The mutagenized seeds were treated with Captan fungicide and sown wet in the field. The peas from one pod per plant were harvested, sown in sand in plastic trays, fertilized with P and K and grown in the greenhouse during winter at about 18C with supplemental fluorescent light. The trays were inoculated with a mixture of Rhizobium strains.

About 27,000 M_2 plants from different EMS treatments (0.1% EMS overnight or 0.5% EMS for 1 or 2 hours on pre-soaked seeds) have been screened. Chlorophyll mutants (1.5-2.7%) were discarded, and plants with nitrogen deficiency symptoms, yellowing from the root upwards, were examined for nodulation at the 7-10 leaf stage. Several tentative mutants have been isolated, and so far three non-nodulating mutants have been confirmed after retesting. One leaky non-fixing mutant behaves in a very peculiar way and may not be a nitrogen fixation mutant as such. Non-confirmed mutants have been "slow" chlorophyll mutants and plants with nodules destroyed by Pythium spp.

1. Jacobsen, E. and W. J. Feenstra. 1984. Plant Sci. Lett. 33:337-344.
2. Kneen, G. E. and T. A. LaRue. 1984. J. Heredity 75:238-240.
3. Messenger, A., G. Due, and J. Picard. 1983. Abstract of OECD workshop "Interactions between carbon dioxide and nitrogen assimilation in higher plants, Zurich, p. 45.