

On the Utilization and Propagation of the Variations Induced by Grafting and Synthetic Artificial Chimera[®]

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We have obtained genetic changes by using grafting and the synthesis of chimeral plants instead of obtaining transformation by other biotechnological methods (Hirata, 2004). Those results showed the potential available for the induction of genetic changes. In the present study, the phenomena for using graft transformation and chimera synthesis are summarized in pepper, brassica, citrus, and other crops.

MATERIALS AND METHODS

We adopted the grafting technique with the special “Mentor Method” for genetic variation induction (Yagishita, 1964; Hirata, 1979). For artificial chimera synthesis, *in vitro* grafting and *in vivo* methods were applied and were successful in obtaining chimeral plants (Noguchi et al., 1994). Many materials were used for the experiments such as *Capsicum* (pepper), *Lycopersicon esculentum* (tomato), *Glycine max* (soybean), *Brassica taxa*, *Raphanus sativus* (radish), *Brassica napus*, *B. oleracea*, *Citrus*, and others were used depending on the research purpose.

RESULTS AND DISCUSSION

- 1) Experiments on the graft-induced variation (graft transformation) and the mechanism of the genetic introduction or induction have been done in pepper, eggplant, tomato, and soybean. Genetic variations and new genetic behaviors (irregular changes) were obtained and partially clarified the existence of gene transfer in the vascular system by grafting (Taller et al., 1999).
- 2) Chimera syntheses could be succeeded by *in vivo* and *in vitro* graftings. Intervarietal chimera in cabbage, interspecific chimera between *B. rapa* and *B. oleracea*, transgenic *B. napus* and *B. oleracea*, intergeneric chimera between radish and red cabbage, and interspecific *Citrus* chimera have been done. Various interactions between three cell layers that make up the plant were observed at morphological, physiological, and protein and DNA molecular levels. The genetic interaction is a very new finding to become applicable in breeding and gene introduction by using chimera tissue.
- 3) Those interactions and genetic inductions both open new aspects and technology for plant breeding and plant propagation.

LITERATURE CITED

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