

## **O.32 - Implications of the second-best decisions in weed control under social constraints**

Hayashi, K.

Optimum crop protection strategies are not always feasible because of social constraints. For example, paddy-upland rotation, which is a common weed control and soil fertility management method in Japan, is not always practiced. When group decisions on cooperative land rotation that were undertaken to comply with government policy on reducing rice production have failed, rotation of upland wheat, upland soybean, and fallow is practiced. This is necessary because the location of paddy cultivation must be in one place, which makes rotation of paddy rice, upland wheat, upland soybean, and fallow unfeasible. In this case, farmers have to employ weed control methods other than paddy flooding which can be considered as ecological weed management. However, potential weed control options are limited to, for example, application of herbicides and lime, which are not necessarily effective because of the existence of herbicide-resistant weeds. Furthermore, increased use of herbicides tends to increase environmental degradation as well as economic costs. Thus, farmers are forced to make the second-best (suboptimum) decisions. This paper defines the second-best decisions made under social constraints by constructing a decision making structure on weed control for wheat cultivation in Japan. Two-objective decision models, which are presented graphically using influence diagrams, are developed for the analysis. The results indicate that under social constraints, farmers are forced to make the second-best decision, in which they cannot apply paddy flooding as ecological weed management for reducing the use of herbicides, and that the suboptimum decision affects the environment as well as the economy.