

CULTIVATING BIODIVERSITY FOR DISEASE CONTROL, A CASE STUDY IN CHINA

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The plant diversity usually suppresses disease epidemics although the ecological mechanisms are not fully known. This ecological principle is manifested in biodiversity-rich cropping practices that reduce crop diseases in many subsistence-farming systems. Modern approaches to disease control are not suitable to these farming systems. Pesticides are often costly to use. New biological technologies have only developed few disease-resistant varieties of commercial value. Many landrace varieties preferred by subsistence farmers remain susceptible to disease epidemics when farmers try to enlarge their areas for markets. As a result, these landrace varieties are often marginalized and replaced when farmers apt to plant more and more a few of commercial disease-resistant varieties. This trend threatens to survival of landrace diversity and associated cultural diversity. It is therefore urgent to find an affordable approach to disease control for landrace varieties.

Rice blast disease has been a serious problem for cultivation of glutinous rice (32% losses) and upland rice (20 –50% losses) in Yunnan, China. Both of them include many traditional landrace varieties. Various inter-plantations of glutinous rice and generally resistant hybrid indica rice were experimented and demonstrated in a large scale to assess its effectiveness of the blast disease control from 1998 to 2000. The results are very encouraging. The inter-plantation approach is simple, effective and economically viable. Farmers in Yunnan and other provinces in China are rapidly adopting the approach. Some farmers have successfully modified the recommended design of inter-plantation to suit specific needs. The mixture approach is helping revive many aromatic rice varieties, which would be very susceptible to diseases if planted in monoculture. They now suffer less disease in mixed plantations and can be produced in a larger scale for commercial markets. Our case demonstrates that proper diversification with traditional or modern crop varieties can be an economically viable option for farmers who want to expand production, and can not afford to use commercial disease - resistant varieties and pesticides for disease control. The diversified plantation also supports maintenance of farmers' landraces. The work is underway to study ecological mechanisms of disease control, and to test viable mixtures of different crop varieties or species for control of specialist and generalist pests.