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GENETIC DIVERSITY AND DISEASE CONTROL IN RICE

Recently, there has been a remarkable demonstration of the role of genetic diversity in disease control of rice. In a major experimental effort that was carried out beginning from the year 1998 (the work is still in progress) experiments in China have shown that

By intercropping resistant modern rice varieties with susceptible traditional rice varieties, the incidence of Rice blast can be decreased significantly - in fact, to the point that no floral spray of fungicide was used after the first year.

The same experiment also showed that there is an 89% increase in the yield of rice.

We are summing up below the salient features of this experiment reported in the Science journal - NATURE.

The experiments were carried out in the Yunnan province of China during the years 1998 - 1999. It was an collaborative effort involving the plant protection department and Agricultural Universities in the Yunnan province at China, International Rice Research Institute at Philippines and Botanists in the Oregon State University of USA. In the Yunnan province of China, farmers have been traditionally preserving Glutinous or "sticky" rice varieties which are used for confections and other speciality dishes. These have a higher market value than other rice types but they have lower yields. They are also highly susceptible to blast disease, caused by the fungus *Magnaporthe grasea*. Non-Glutinous hybrid varieties are less susceptible to rice blasts. Experiments were based on a farmer's practice of dispersing single row of glutinous rice between groups of four rows of hybrid rice. The layout of rice is explained in the diagram on page 2.

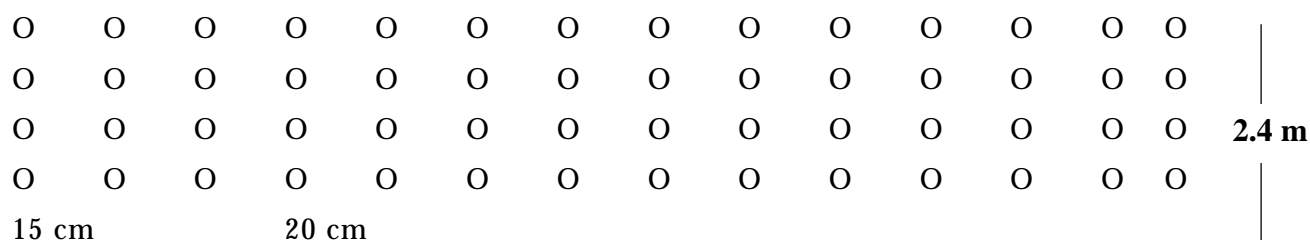
In the first year of the experiment, mixed plots were set up involving two different traditional rice varieties which are susceptible, namely - Huangkeneo and Zinuo. Two hybrid rice varieties were used for intercropping namely Shanyou 63 and Shanyou 22. Four different mixtures were planted in 812 hectares of area in five townships in the Shiping county of Yunnan province. This provided excellent blast control when varieties were mixed. Hence, only one Floral fungicide spray was applied.

In the second year, the study was expanded to 3,342 hectares of rice fields. This time five townships in the adjacent county of Jianshui were also included. The results were quite spectacular. The diversification had a substantial impact of rice blast severity. In the first year of experiment, the panicle blast severity in the susceptible variety averaged 20% in the monocultures but was reduced to 1% when dispersed within mixed population. Panicle blast severities of hybrid varieties which averaged 1.21 % in monocultures was reduced to varying degrees in mixed plots. Results from 1999 were very similar to 1998 season. Disease susceptible rice varieties planted in mixtures with resistant varieties had 89% greater yield and blast was 94% less severe than when they were grown in monocultures. The experiment was so successful that fungicidal sprays were no longer applied by the end of the two year programme.

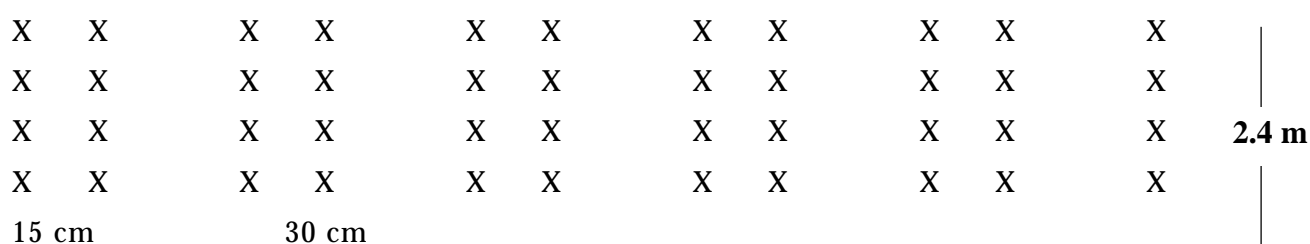
It is interesting to see that the experiments are currently being continued and in the third year - they are being expanded to 40,000 hectares !! These experiments, we believe, have great significance in the Indian context. India also has a great varietal diversity of not only rice but also a vast number of other crops. Harvesting is by and large still carried out manually with a sickle and hence separate harvests of intercropped mixed varieties is feasible and possible. The results of the above experiments have drawn great attention and offer enormous possibilities in terms of the use of varietal and species diversity in sustainable agriculture.

Summary by A.V.Balasubramanian, CIKS based on the paper - "Genetic Diversity and Disease Control in Rice" Youyong Zhu et.al NATURE Volume 406, 7th August 2000 pp. 718-722.

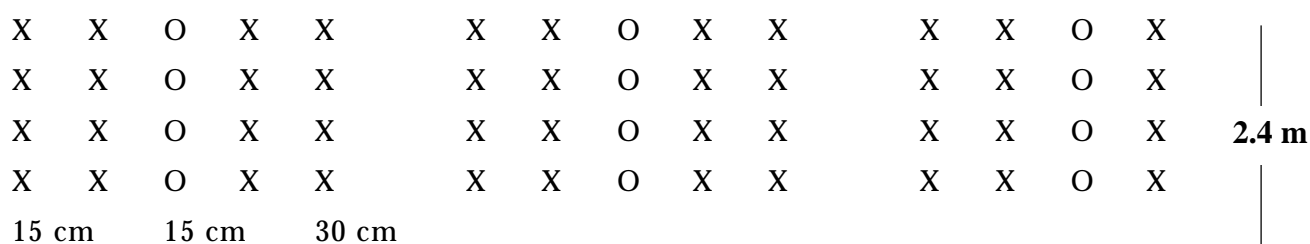
Glutinous monoculture



Hybrid monoculture



Mixture





Newsline

ENDOSULFAN SHOWERS

Swarga, a village in the Kasargod district of Kerala has fallen victim to the unscrupulous use of the pesticide, Endosulfan. It is an Organo-chloride banned in many countries, known for its acute and chronic effects on human beings. This village overflows with cases of mental retardation, congenital defects, asthma, allergies and even cases of cancer. The villagers claim that the cause can be traced to the aerial spraying of Endosulfan on the Cashew Plantations in the nearby hills to ward off tea mosquito which affects cashew. They also claim that aerial spraying of Endosulfan is carried out thrice a year for the past thirty years. Are we in the making of another Bhopal?

Source: Business Line, 17/01/2001.

BROWN REVOLUTION

Morarka foundation at its Durgapura Research Centre has created artificial conditions for the rapid multiplication of earthworms (400 - 500 times annually). With this breakthrough they have established 250 farm units in four districts of Rajasthan to produce an average of 10 tonnes of vermicompost /unit/year. Their project director also claims that they can

provide assistance to 5000 farmers initially for setting up vermicompost culture units.

Source : Business Line, 8/1/2001.

COURT STAYS SPRAYING OF CASHEW PESTICIDE

The Kasargod Munsiff Court has directed the Plantation Corporation of Kerala to refrain from spraying 'endosulfan' pesticide on its cashew plantations with immediate effect.

In the wake of a 'media blitz' linking the etiology of various diseases afflicting people in the vicinity of the Plantation Corporation's 4,715-hectare cashew plantation to the aerial spraying of endosulfan, the court has issued a 'temporary stay order' which will be in effect till February 8.

The Plantation Corporation had distributed hand-bills in the region stating that aerial spraying of endosulfan, a pesticide used to protect cashew plantations from the tea mosquito, had been scheduled for Thursday. The representatives of the affected villages sought a ban on the pesticide till a survey is conducted regarding the effects of endosulfan on the life systems of the region.

Source : Business Line, 27.01.2001

Pesticide Usage in Different Crops in India (1999)

Cotton	34,733 tonnes	Rice	10,934 tonnes
Vegetables	8362 tonnes	Plantation crops	5145 tonnes

Source : National Centre for Integrated Pest Management, New Delhi.



TROJAN HORSES : PERSISTENT ORGANIC POLLUTANTS, TOXICS LINKS, 2000 PP. 88

This book is an outcome of the joint-effort of Srishti and Toxics Link. The book comprises of 7 chapters. It packs lot of information not only on well-known Persistent Organic Pollutants (POPs) but also has chapters devoted to lesser-known POPs like dioxins, Pesticide Policy and Pesticides load in the Environment. It also touches upon alternatives .

Price : Rs. 100.00

PESTICIDES IN INDIA : ENVIRONMENT AND HEALTH SOURCEBOOK, TOXICS LINKS, 2000 PP. 173

This book is organised into 3 important sections. The first one carries thought-provoking articles related to Toxics by prominent personalities. The second section gives a lucid picture of the Pesticide status in India and also deals with health effects related

to pesticides. The book also hosts an elaborate directory providing information on Pesticide Research Laboratories ,Government institutions and NGOs working in areas related to pesticides

Price : Rs.150.00

Available from : Both these books can be had from Toxics Link, No 7 Fourth Street, Venkateshwara Nagar, Adyar, Chennai-600 020

INDIGENOUS RICE VARIETIES, S. Arumuga samy, N. Jayashankar, K. Subramanian, Subhashini Sridhar, K. Vijayalakshmi, 2001, pp. 77

This book provides detailed information on 34 indigenous rice varieties. For each variety the cultivation details, agronomical features, characteristics of the earhead and grains, yields of grain and straw are given. It also provides information of certain special features of the variety such as pest resistance, drought tolerance, medicinal properties, etc. All the information provided in this book is based upon our own experience of the cultivation of these varieties under field conditions - this adds to the value of the book. This book is available both in English and Tamil.

Price : Rs. 60/- (English) Rs. 40/- (Tamil)

Available from : CIKS, No.30, Gandhi Mandapam Road, Kotturpuram, Chennai - 600 085

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