

# Effect of Gamma Irradiation on Fungi in Stored Rice.

## 2.4 EFFECT OF GAMMA IRRADIATION ON FUNGI IN STORED RICE

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### INTRODUCTION

Fungi which invade seeds have been categorised ecologically into two groups viz. field fungi and storage fungi (Christensen & Kaufmann, 1965). Field fungi may either be pathogenic or saprophytic, infecting seeds of developing plants in the field; the common examples being species of Alternaria, Cladosporium, Curvularia and Fusarium. Storage fungi are those that grow on stored products of which most are species of Aspergillus and Penicillium which are active at relative humidities ranging from 70% to 90%. In Malaysia, Masdek (1980) reported that Aspergillus and Penicillium spp. are the predominant fungi on stored rice.

The objective of this study is to examine the effect of different doses of gamma irradiation on fungi infecting rice stored in various packaging materials.

### MATERIALS AND METHODS

The Agar Plate Test for the examination of fungal colonies from seeds on agar medium (Neergard, 1976) was used. Samples of rice were randomly sampled from the packages of the various packaging materials. 100 grains from each of the samples were used and plated on petri dishes containing Potato Dextrose Agar (PDA). Two replicates (100 grains per replication) were made for each treatment. Surface treatment of the seeds was carried out prior to plating by soaking the seeds for 5 minutes in 1% sodium hypochlorite (Chlorox<sup>R</sup>). The seeds were then incubated in the laboratory (temperature  $28^{\circ} \pm 2^{\circ}\text{C}$ ). Macroscopic and microscopic examinations of fungi isolated from each seed were carried out after 7 days of incubation.

## RESULTS

The mean percentage (%) of fungi isolated from irradiated rice stored up to 24 months in gunny, heavy duty, woven non-laminated and woven laminated material are shown in Tables 2.4.1, 2.4.2, 2.4.3, and 2.4.4. From the histograms (See Figures 2.4.1 - 2.4.2) it was observed that the percentage (%) of fungi isolated did not appear to decrease with increase in irradiation of up to 2 kGy. This was observed irrespective of the type of packaging material used. There was also no indication of any significant reduction in the percentage of fungi isolated with increasing time of storage (up to 24 months) at all levels of irradiation treatment and irrespective of the type of packaging material used.

## DISCUSSION

The study undertaken to observe the effect of different levels of gamma irradiation on rice stored in different packaging materials showed that gamma irradiation of up to 2 kGy did not reduced the percentage of fungi isolated from stored rice. The majority of the fungi isolated were Aspergillus and Penicillium species. However, other species recorded were: Cladosporium, Fusarium, Rhizopus, Mucor, Choanephora, Myrothecium, Curvularia, Trichoderma, Colletotrichum and Pestalotiopsis.

## REFERENCES

- Christensen, C.M. and Kaufmann, H.H. (1965) Deterioration of stored grains by fungi. Ann. Rev. Phytopathology. Vol.3:69-91
- Masdek, N. (1980) Annual Report. Crop Protection Branch, ~~MAFIS~~, Serdang.
- Neergard, P. (1979) Seed Pathology. Vol.I. The Macmillan Press Ltd. London 839 pp

Dose (KGY)	Storage time (months)						
	0	3	6	9	12	18	24
0	60	45	25	80	60	65	85
0.2	60	65	80	75	70	90	75
0.4	65	80	20	75	70	45	80
0.6	55	75	75	50	65	80	45
0.8	90	80	80	55	65	100	35
1.0	45	75	60	90	35	90	55
2.0	70	85	60	35	50	70	50

Table 2.4.2: Mean percentage (%) of fungi isolated from rice stored in heavy duty material

Dose (KGY)	Storage time (months)						
	0	3	6	9	12	18	24
0	30	45	65	25	70	65	55
0.2	50	45	35	70	60	60	85
0.4	20	80	55	50	40	85	70
0.6	20	60	65	45	60	35	65
0.8	30	50	80	60	35	50	90
1.0	40	75	75	45	45	75	55
2.0	40	20	50	80	45	45	65

Table 2.4.3: Mean percentage (%) of fungi isolated from rice stored in woven non-laminated material

Dose (KGY)	Storage time (months)							
	0	3	6	9	12	18	24	
0	40	25	70	55	40	70	95	
0.2	75	65	35	50	65	30	60	
0.4	75	50	65	55	40	45	40	
0.6	60	60	60	60	40	100	75	
0.8	85	65	35	65	55	30	50	
1.0	25	75	80	95	25	40	75	
2.0	30	75	80	95	50	40	80	

Table 2.4.4: Mean percentage (%) of fungi isolated from rice stored in woven laminated material

Dose (KGY)	Storage time (months)							
	0	3	6	9	12	18	24	
0	35	45	50	75	80	75	90	
0.2	45	65	45	65	20	60	85	
0.4	45	45	45	65	50	80	60	
0.6	90	80	60	50	35	35	80	
0.8	55	70	70	80	30	65	85	
1.0	20	40	60	70	35	60	95	
2.0	45	65	50	60	20	90	65	

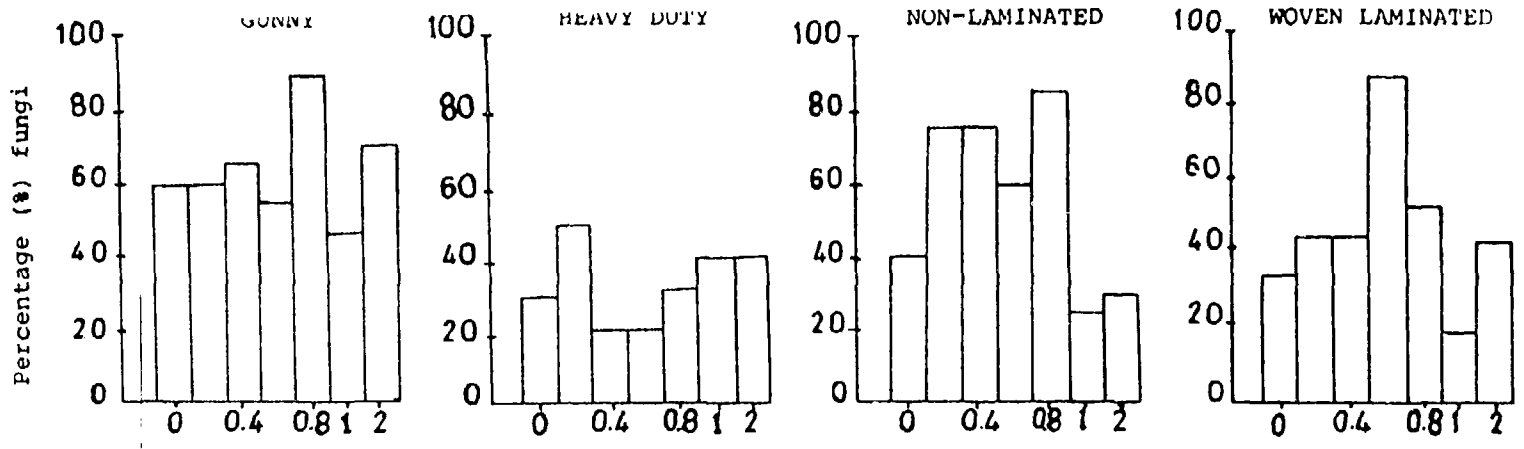


Figure 2.4.1: Effect of irradiation on the percentage of fungi in stored rice (0 month)

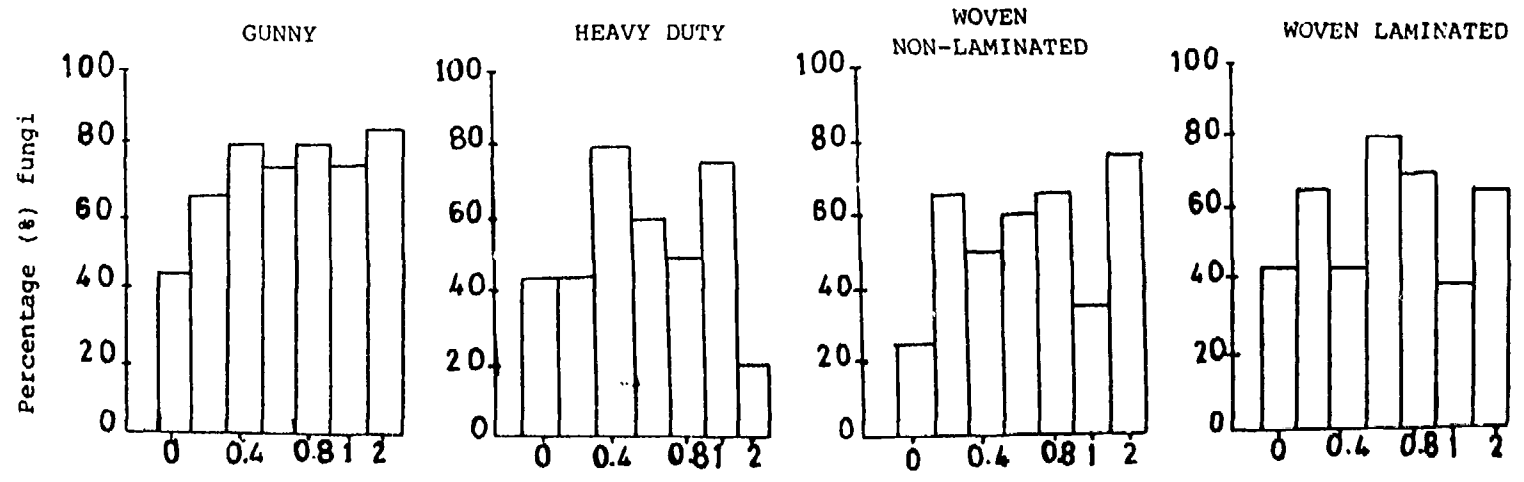


Figure 2.4.2: Effect of irradiation on the percentage of fungi in stored rice (3rd month)

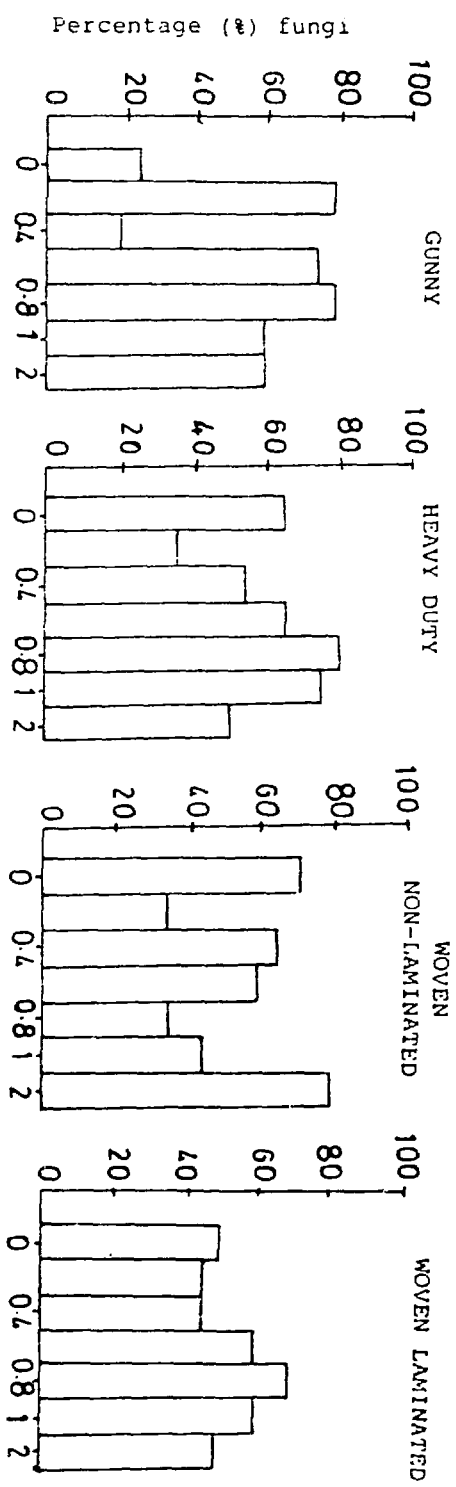


Figure 2.4.3: Effect of irradiation on the percentage of fungi in stored rice (6th month)

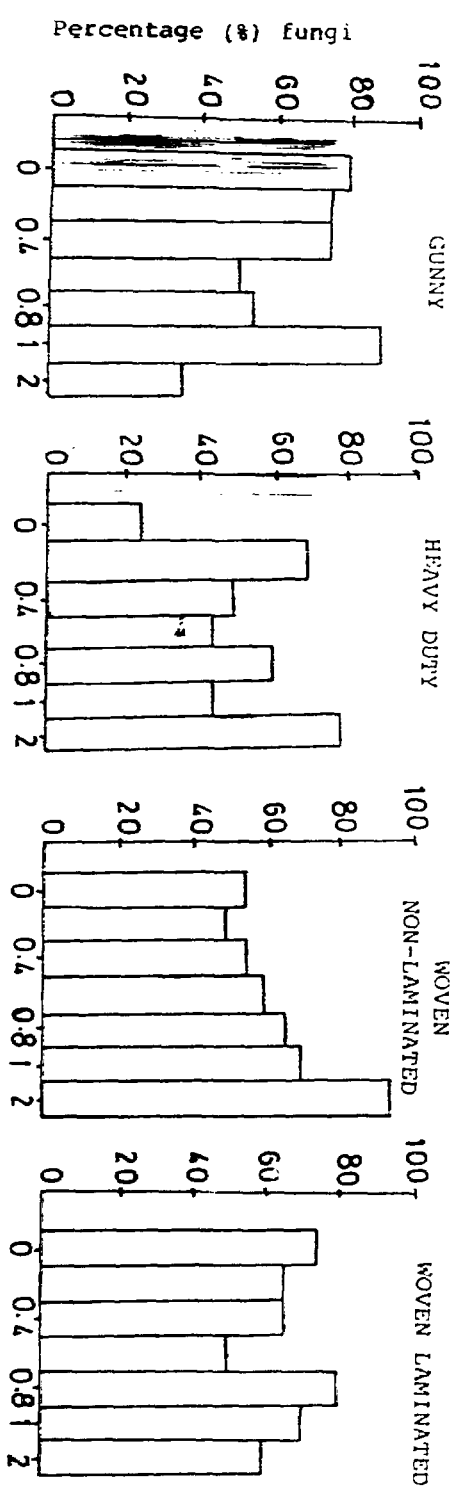


Figure 2.4.4: Effect of irradiation on the percentage of fungi in stored rice (9th month)

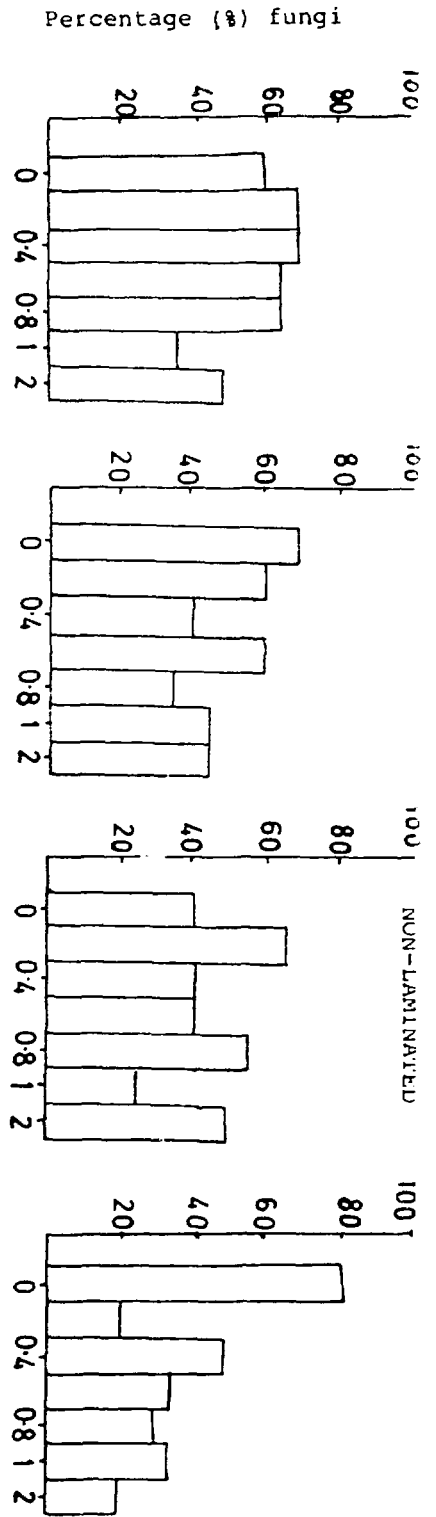


Figure 2.4.5: Effect of irradiation on the percentage of fungi in stored rice (12th month)

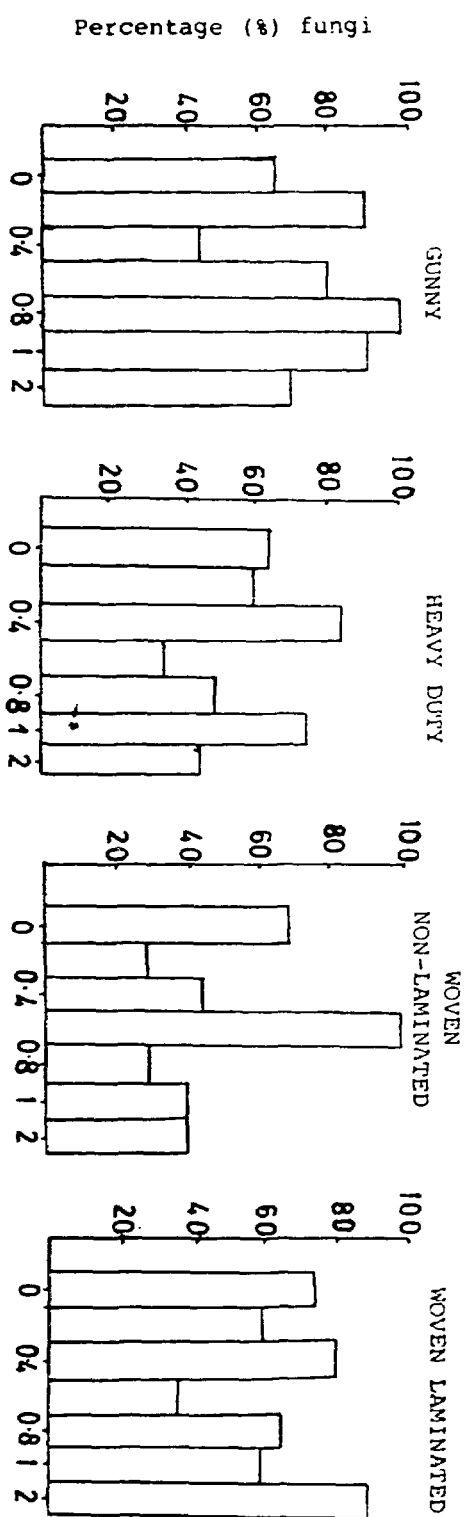


Figure 2.4.6: Effect of irradiation on the percentage of fungi in stored rice (18th month)



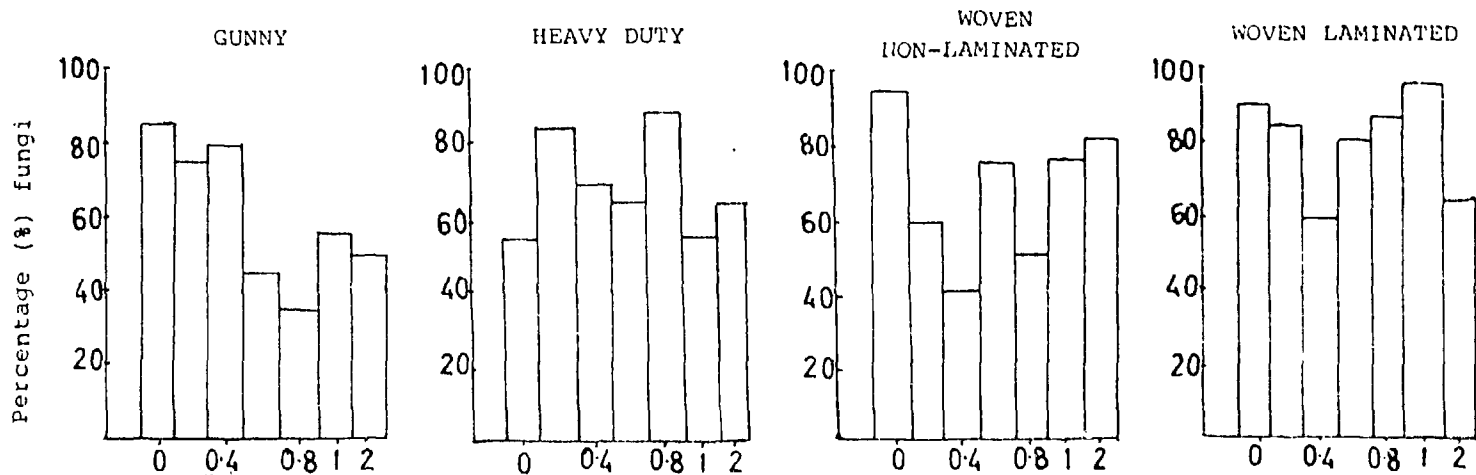


Figure 2.4.7: Effect of irradiation on the percentage of fungi in stored rice (24th month)