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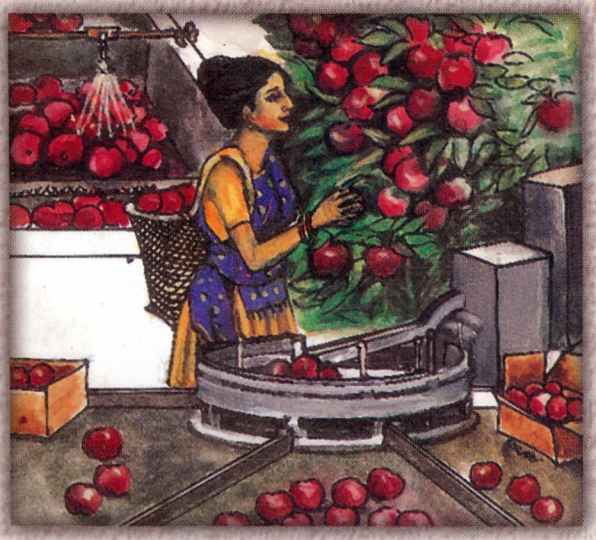

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CONTENTS

B Crow; M Mackintosh; C Martin. London: Earthscan, p. 91-103.

244 KAINATH, GS. 1982. **Foodgrains marketing system in India**. New Delhi: Associated Publishing House, 124 p.

The study analyzes the salient organizational and operational features of the food grain marketing system in the wake of a technological breakthrough in Punjab, to test existing hypotheses and generate new ones. Specific objectives were to examine: (1) the impact of the expanded marketed surplus on the pattern of market arrivals; (2) the concentration of marketed surplus of foodgrains for different farm situations; (3) factors affecting marketed surplus and to estimate the elasticity of production marketed surplus of food grains; (4) variations in food grains prices; (5) the extent of interdependence in inter-market price formation; and (6) to examine the impact of state intervention in the foodgrains marketing system. Both primary and secondary data were used. The analysis supports the hypothesis that the pattern of marketed surplus as a percentage of total production as between wheat and paddy was not the same on the three different farm size groups. The average difference in per acre marketed surplus of wheat and paddy was significant only in the case of the small-medium and medium-large groups. Procurement policy has significantly affected the sales of wheat and paddy during different seasons, post-harvest, mid-season and lean periods.

245 KRISHNAJI, N. 1991. **Agricultural price policy in Asia**. *Indian Journal of Agricultural Economics*, 46: 2, 186-192.

In developing countries, the State has assumed a paramount role in bringing about economic transformation in the post-colonial phase, with varying degrees of intervention in the market and of planning at central level. The prevalence of poverty, low standards of living and the inadequacy of the normal market forces to generate progress at a rapid rate to satisfy the basic aspirations of the population were the major problems encountered by the ruling parties at the end of foreign political domination. Land reforms as could be implemented under existing political constraints yielded poor results in terms of overall growth. The provision of price incentives to promote agricultural growth within the structure of the existing pattern of political power and of property in land and its use thus emerged as a feasible solution to the ruling governments. The experience of India and the Philippines are reviewed based mainly on the studies of Bhalla and Tyagi (1989) and Intal and Power (1990) and an FAO Study (1989). As far as India is concerned, price policy in the case of rice and wheat has gone a long way in realizing the objectives set by the policy makers. Despite many institutional constraints, price policy has also succeeded in ensuring a more rational utilization of productive resources. But inter-regional price disparities continue to be on the high side. Intal and Power include political factors in analysing the Philippine experience and point out that there has been no political party that has represented the particular interest of any economic groups. After a detailed analysis of a number of sectors (rice and maize, sugarcane and coconut), they conclude that price intervention has not systematically been designed to hinder or harm the agricultural sector. In the Philippines, as in India, the political leadership comes from the social elite class and the interests of this class receive high priority in policy making.

246 KUMARI, R. 1991. **Impact of mechanisation of foodgrain marketing efficiency: a case study in Bihar**. *Indian Journal of Agricultural Marketing*, 5: 1, 9-15.

The objectives of this study were: (1) to analyse the extent of mechanization; and (2) to evaluate the impact of mechanization on marketing efficiency at Naugachia agricultural market in Bihar state, India. This market had been recently developed under the World Bank Market Construction Project. The findings of the study show that the equipment for mechanizing marketing operations was adequate but that its utilization has not been very satisfactory. Analysis of transport use pattern of arrivals and despatch shows that the composition of mode of transport has changed towards mechanization. The total volume of arrivals significantly increased in the case of wheat and maize as a result of mechanization of marketing operations. The standardization of goods in terms of grading and cleaning showed some improvement.

247 WICKREMASINGHE, YM. 1988. **Production and marketing of maize from Anuradhapura District, Sri Lanka**. Department of Agriculture, Peradeniya (Sri Lanka). Diversified Agricultural Research Project. 42 p.

WHEAT

Postharvest handling

248 DHINDSA, KS; SINGH, J. 1983. **Marketed surplus of wheat and paddy by farm size in Punjab - a case study**. *Margin*, 15: 2, 81-88.

An analysis is made of the time pattern of the marketed surplus of food grains by farm size and factors affecting the post-harvest sales of different categories of farmers. A multistage stratified random sampling method was used in the selection of regulated markets in Amritsar district for the years 1977/78 and 1978/79. A Cobb-Douglas production function was used to estimate post-harvest sale functions for wheat and paddy by different groups of farm size. The study showed that small and medium farmers held a large percentage of their production of food grains for family needs. A large percentage of wheat production was retained, compared to that of paddy, at farm level. Small farmers sold a relatively large percentage of their marketed surplus of wheat during the post-harvest period compared to big farmers. The elasticity coefficients obtained in respect of credit borrowed by the small and medium farmers were found to be statistically significant. Field experience showed that farmers do not have storage facilities at village level.

249 HUSSAIN, MD; ZIAUDDIN, ATM; BALA, BK. 1979. **Performance of wheat milling process.** *Agricultural Mechanisation in Asia, Africa and Latin America*, 10: 1, 23-26.

250 RAZZAQ, A; BASHIR AHMAD, C; SABIR, CBA. 1992. **A comparative study of partial vs complete mechanized harvesting and threshing of wheat.** *Agricultural Mechanization in Asia, Africa and Latin America*, 23: 1, 42-44; 3 ref.

The comparative economic benefits of partially and completely mechanized wheat harvesting and threshing practices were investigated. Manual harvesting plus mechanical threshing were compared with self-propelled and tractor-drawn combine harvesters deployed for harvesting wheat. It was established that use of a combine harvester gave higher wheat yields than manual harvesting plus mechanical threshing. Completely mechanized wheat harvesting and threshing proved more economical than the partially mechanized technique currently practised in the country.

Storage

251 AGARWAL, GP; THAKUR, MK; AWASTHY, S. 1982. **Changes in starch content and fat acidity value of wheat grains due to mycoflora under various storage conditions and their chemical control in Madhya Pradesh.** *Biological Bulletin of India*, 4: 2, 70-77; 22 ref.

Fungicide treated composite samples of 4 high yielding Jabalpur wheat varieties were stored under various temp. and RH conditions. Analysis of deteriorated grains after 6 and 12 months revealed a significant decline in starch contents and a rise in the level of fat acidity value. Deterioration was min. after storage at 20°C and 35% RH. Of the 5 fungicides tested Agrosan GN [phenylmercury acetate + ethylmercury chloride] and captan performed best.

252 DUBE, S; SHUKLA, HS; TRIPATHI, SC. 1988. **Changes in sugar and protein contents of wheat due to aspergilli.** *Indian Phytopathology*, 41: 4, 633-635; 3 ref.

Surface sterilized wheat seeds were inoculated with *A. niger*, *A. tamarii*, *A. flavus* and *A. parasiticus*. After storage for 9 months total insoluble and insoluble sugars, insoluble nitrogen and protein contents were determined. Infection with *A. niger* and *A. tamarii* caused a decrease in insoluble sugar and an increase in total soluble sugar whilst infection with *A. flavus* and *A. parasiticus* caused an increase in insoluble sugar and a decrease in total soluble sugar. Total insoluble nitrogen and protein contents increased in seeds infected with *A. flavus* and *A. parasiticus*, decreased in seeds infected with *A. tamarii* and was unchanged in seeds infected by *A. niger*.

253 GHOSH, J; NANDI, B. 1986. **Deteriorative abilities of some common storage fungi of wheat.** *Seed Science and Technology*, 14: 1, 141-149; 16 ref.

Grain deteriorating abilities of some common storage fungi of wheat (*Aspergillus niger*, *A. flavus*, *A. fumigatus*, *A. glaucus*, *A. sydowi* and *Penicillium jenseni*) were studied. Cell free culture filtrates caused a considerable reduction in germination and in seedling growth of surface disinfected wheat grains. Fungal invasion of sterilized grains generally increased chitin and decreased carbohydrate content. These changes increased with the duration of storage. The test fungi varied in their grain deteriorating abilities.

254 HYDER ALI, MM; FAKIR, GA. 1992. **Fungi associated with wheat grains in Bangladesh and their pathogenic significance.** *Bangladesh Journal of Botany*, 21: 2, 173-180.

255 KUNWAR, IK; MEHROTRA, BS. 1988. **Effect of culture filtrates of storage fungi on germination and sprouting of wheat grains.** *Proceedings of the Indian National Science Academy. Part B, Biological Sciences*, 54: 6, 399-400; 13 ref.

Culture filtrates of all 20 frequently isolated fungi tested were inhibitory to germination and sprouting of grain. *Aspergillus clavatus* and *Penicillium urticae* were the most inhibitory and the effects on sprouting were more pronounced. The opt. incubation period for the maximum inhibition of germination varied with the species.

256 PANDEY, H; PANDE, N; MEHROTRA, BS. 1988. ***Aspergillus kambarensis*, a new report from India**. *Current Science, India*, 57: 12, 672-673.

A. kambarensis was identified from stored wheat and maize in India on the basis of colony growth characteristics on Czapek's agar and malt extract media. *A. kambarensis* has been reported to be synonymous with A. oryzae, but it is thought to be more closely related to *A. flavus*. It is recommended that *A. kambarensis* be considered a separate species.

257 RAJU, P. 1984. **The staggering storage losses - causes and extent**. *Pesticides*, 18: 1, 35-37; 22 ref.

This review of the biotic and abiotic factors that cause considerable losses of stored foodstuffs in India (about 20% as compared with 5% in Europe) includes sections on insects and mites, with special reference to grain damage. The insects most injurious to stored grain in the Punjab were the *Coleoptera Rhyzopertha dominica* (the commonest species), *Sitophilus oryzae*, *Tribolium castaneum* and *Trogoderma granarium*, but *Sitotroga cerealella*, *Laemophloeus minutus* [*Cryptolestes pusillus*] and *Liposcelis sp.* were also observed occasionally. It was found that grain with over 0.5% kernel infestation was unfit for milling, and that wheat flour containing over 10 mg uric acid/100 g (from insect contamination) was unacceptable to consumers. Storage mites, which required a high relative humidity in the atmosphere and a high moisture content in their food, consisted largely of the flour and grain mite [*Acarus siro*] and *Tyroglyphus putrescentiae* [*Tyrophagus putrescentiae*], of which the 2nd species was found in foods with a relatively high protein and fat content such as wheat, oats, barley and flour. The effect of temperature and humidity (including moisture content of stored food) on the deterioration of this food is discussed in relation to its effect on insect pest survival and development, and it is pointed out that respiratory exchanges of both grains and insects in airtight bins result in an oxygen depletion fatal to the pests.

258 SINGH, PP; BEDI, PS; DHEERA SINGH. 1986. **Effect of storage microflora on the total lipid and free fatty acid contents of wheat grains stored under different storage conditions.** *Indian Phytopathology*, 39: 4, 592-594; 11 ref.

The lipid contents were reduced during storage, losses being minimal in grain stored in gunny bags, greatest in earthern pots and intermediate in polythene lined bags and tin boxes. Stored grains showed increases in free fatty acids, particularly in earthern pots. Incidence of storage fungi (predominantly *Aspergillus flavus*) and bacteria was highest in the earthern pot samples.

259 SINGH, T; TYAGI, RPS; RAM, B. 1984. **Bavistin and bavistin + TMTD as effective fungicides for control of storage fungi**. *Pesticides*, 18: 11, 35, 41; 8 ref.

In lab. tests with freshly harvested wheat grains sterilized and inoculated with *Aspergillus sp.* and *Penicillium sp.*, seed treatment with Bavistin [carbendazim] + TMTD [thiram] controlled storage fungi for at least 275 d while Bavistin alone was effective for short term storage (up to 45 d.). Neither fungicide adversely affected seed germination.

260 SINHA, KK; SINHA, AK. 1991. **Effect of *Sitophilus oryzae* infestation on *Aspergillus flavus* infection and aflatoxin contamination in stored wheat**. *Journal of Stored Products Research*, 27: 1, 65-68; 22 ref.

Moisture content, *Aspergillus flavus* infection, and aflatoxin production were investigated in 6.5 kg lots of wheat grain infested with *Sitophilus oryzae* and/or infected with *A. flavus* at harvest and during 3 months storage in metal pots. The grain moisture content and *A. flavus* infection rates increased throughout the storage period and were greatest in wheat lots infested with both *S. oryzae* and *A. flavus*. Insect infestation correlated with increased aflatoxin production. Toxin producing strains of *A. flavus* were isolated from wheat grains and internally from the weevils.

261 SINHA, KK; SINHA, AK. 1991. **Incidence of mycotoxigenic fungi on stored grain insects, *Sitophilus oryzae* and *Tribolium castaneum***. *Proceedings of the Indian National Science Academy. Part B, Biological Sciences*, 57: 1, 77-80; 13 ref.

Aspergillus flavus, *A. ochraceus*, *Penicillium citrinum*, *Rhizopus spp.* and *Mucor spp.* were associated with *S. oryzae* and *T. castaneum* in stored wheat in north Bihar, India. Incidence of *A. flavus* was maximum (44%) followed by *P. citrinum* (22.5%). Aflatoxins, ochratoxin A and citrinin were produced in vitro by 33 of 88 *A. flavus* isolates, 4 of 13 *A. ochraceus* isolates and 10 of 45 *P. citrinum* isolates, respectively.

Storage decay

262 BALA, BK; HUSSAIN, MD; SAIF, SMH; SUSSAIN, MI. 1980. **Effects of moisture content on qualitative and quantitative losses in wheat**. *Agricultural Mechanization in Asia, Africa and Latin America*, Tokyo, Japan.: 11: 2, 69-71.

263 IRSHAD, M; AZAM, M; BALOCH, UK. 1991. **Quality comparison of public sector wheat stored during 1984-85 in Rawalpindi region**. *Pakistan Journal of Agricultural Research*, 12: 2, 77-86.

264 KHAN, RM; AGARWAL, V; MATHUR, BN. 1990. **Chemical control of simultaneous cereal cyst nematode and termite infestations in wheat in Rajasthan, India**. *RACHIS (ICARDA) Barley and Wheat Newsletter*, 9: 2, 9-11.

265 MEHROTRA, BS; PANDE, Neeta. 1985. **Do storage insects respond selectively towards fungi associated with stored wheat?**. *National Academy of Sciences, India, Science Letters*, 8: 10, 303-304; 3 ref.

In tests with the storage insects *Tribolium castaneum*, *Rhyzopertha dominica* and *Sitophilus oryzae*, preference was shown for grains infested with field fungi (particularly *Drechslera spicifera* [*Cochliobolus spicifer*]) rather than with storage fungi. Among the latter, preference was shown for *Aspergillus niger*, *A. sojae*, *A. fumigatus*, *A. tamarii* and *A. terreus* over *A. parasiticus*, *Trichoderma viride* and *A. flavus*.

266 MOHAMMAD IRSHAD; KHAN, AZAM; BALOCH, UK. 1988. **Losses in wheat in public sector storage in Rawalpindi region during 1984-85**. *Pakistan Journal of Agricultural Research*, 9: 2, 136-140; 7 ref.

During 1984-85 in Rawalpindi, Pakistan, losses in stored wheat wt ranged from 0.2 to 2.9% over a period of 1-10.5 months. Insects caused the most damage, with *Trogoderma granarium*, *Rhyzopertha dominica*, *Sitophilus oryzae* and *Tribolium castaneum* being the most common species. *Aspergillus flavus* and *Penicillium sp.* also contributed to the losses.

267 RAMZAN, M; CHAWLA, RP; CHAHAL, BS. 1986. **Efficacy of pre-harvest application of some insecticides on wheat for post-harvest protection against storage-pests**. *Pesticides*, 20: 7, 50-51; 6 ref.

The effectiveness of pre-harvest treatment of wheat with 5 photostable synthetic pyrethroids and one organophosphorus insecticide, etrimfos, in controlling insect pests during subsequent storage was assessed in Punjab, India. Cypermethrin at 50 g a.i./ha, deltamethrin at 10 g a.i., fenvalerate at 50 g a.i., flucythrinate at 50 g a.i., permethrin at 50 g a.i., etrimfos at 625 g a.i. and a standard, malathion at 625 g a.i., were applied near maturity. The crop was harvested 42 days after spray treatment. The residual toxicity of the insecticidal treatments was assessed by confining 20 adults each of the *bostrichid Rhyzopertha dominica*, the *curculionid Sitophilus oryzae* and the tenebrionid *Tribolium castaneum* in glass vials containing samples of wheat from each treatment and assessing mortality after 7 days' exposure. All the insecticide treatments reduced kernel damage by 2-25% over the control after 2 months' storage, but none gave satisfactory control of the insects.

268 RAMZAN, M; CHAHAL, BS; JUDGE, BK. 1989. **Field evaluation of synthetic pyrethroids for the protection of stored wheat seed against storage pests**. *International Pest Control*, 31: 4, 87-89; 14 ref.

Three field trials were conducted in India during 1985-87 using synthetic pyrethroids, namely deltamethrin, fenvalerate, fenpropathrin and cypermethrin, each at 4 and 8 p.p.m. to protect stored wheat grain against insect pests, in comparison to malathion at 125 p.p.m. and an untreated control. It was observed that when grain was treated with both the dosages of a wettable formulation of deltamethrin, it was almost free from insect damage 6 months after treatment. In other pyrethroid treatments, the damage 6 months after treatment varied from 2.7 to 7.9% during 1985. However, during 1986 and 1987, the damage did not exceed 2.0 and 1.0%, respectively, the 2 years being on a par with one another. Fenpropathrin proved significantly inferior. In malathion-treated seed the loss varied from 11.0 to 13.0% as compared to the control where the losses were 29.5 and 34.2% in 1986 and 1987, respectively It was observed that after one year's storage of pyrethroid-treated grains, there was no appreciable reduction in viability even at a dosage of 250 p.p.m., hence they can be safely used for seed treatment.

269 RANA, PN; GANESH, KC. 1976. **A review of entomological problems on stored wheat with special emphasis on wheat**. *Winter Crop Seminar*.

270 RANA, PN; GANESH, KC. 1976. **Review of entomological problems of stored grain with special emphasis in wheat**. *Winter Crop Seminar, Lalitpur*. National Wheat Programme, Nepal.

271 SINHA, AK; SINHA, KK. 1990. **Insect pests, *Aspergillus flavus* and aflatoxin contamination in**

stored wheat: a survey at North Bihar (India). *Journal of Stored Products Research*, 26: 4, 223-226; 28 ref.

Fifty stored wheat samples (25 each of insect pest-free and infested) were collected from northern Bihar, India. Of the 4 major pests recorded, *Sitophilus oryzae* was the dominant insect, followed by *Tribolium castaneum*, *Rhyzopertha dominica* and *Trogoderma granarium*. *Aspergillus flavus* was recorded in all samples: infection in insect-damaged samples was 87% and in insect-free samples 25%. Aflatoxin contamination was found in 19 and 2 of the insect-damaged and insect-free lots, respectively The role of insect pests in making wheat grains vulnerable to *A. flavus* infection and subsequent aflatoxin production is discussed.

272 VIR, D. 1986. **Storage disease of wheat**. *Problems and progress of wheat pathology in South Asia*. New Delhi: Malhotra Publishing House, p. 296-305; 48 ref.

This chapter provides information on the mycoflora of stored wheat grains and seeds, the harmful effects of fungi on stored wheat (including discoloration, reduced seed germination, changes in nutritional content of grain and mycotoxins), and control.

SORGHUM

Postharvest handling

273 MALLESHI, NG; DAODU, MA; CHANDRASEKHAR, A. 1989. **Development of weaning food formulations based on malting and roller drying of sorghum and cowpea**. *International Journal of Food Science and Technology*, 24: 5, 511-519; 24 ref.

Sorghum and cowpea were steeped in water for 16 h, allowed to germinate for 72 and 24 h, respectively, then dried to about 14% moisture. Roots and shoots of sorghum sprouts were cleaned off and the devegetated malt was kilned at 70°C, moistened with 3% added water, heaped for about 10 min, milled and sieved to obtain debranned malt flour. Cowpea sprouts were split, dehusked, kilned at 85° and milled. Malted sorghum and malted cowpea flours were blended in the proportion of 70:30 to prepare the malted weaning food (MWF). A precooked weaning food (RDF) was prepared by roller drying a cold-water slurry consisting of 70% pearled sorghum flour and 30% toasted cowpea flour. The cooked paste viscosity of MWF was lower than that of RDF and the blend of raw sorghum (70%) and cowpea (30%), at all comparable slurry concentrations. The protein content of MWF was 13.4% and that of RDF was 13.0%, but the available lysine content of MWF protein was 3.85% and that of RDF protein was 2.95%. The protein efficiency ratio for MWF (2.26) was significantly higher than that for RDF (1.87).

274 RAO, A; VIMALA, V. 1993. **Efficacy of tricalcium phosphate on the storage quality of sorghum flour**. *Journal of Food Science and Technology - Mysore*, 30: 1, 58-59.

The efficacy of tricalcium phosphate (2%) as pre-storage treatment in whole and dehulled sorghum flour has been studied. Treatment with tricalcium phosphate controlled insect infestation and associated changes in fat acidity, alcoholic acidity, and lipase activity. A positive correlation between fat acidity and lipase activity was observed. Dehulling prior to milling contributed to better storage quality.

275 SHELAR, VR; BAPAT, DR. 1991. **Effect of storage conditions on viability and vigour in sorghum**. *Annals of Plant Physiology*, 5: 2, 176-182; 14 ref.

The effects of storage temp. of 20 or 40°C and 45, 60 or 90% RH on seed moisture content, vigour and germination and seedling growth of sorghum cv. CSH-5, CSH-9, SPV-462 and SPV-504 were studied after 180 or 300 d of storage. Storage at 20° and 45% RH gave the highest germination of around 80%. Seeds kept at 40° did not germinate after 180 d storage irrespective of RH. Seed viability, root and shoot length and vigour of all genotypes decreased and moisture content increased with storage time.

Storage decay

276 KRISHNASAMY, V; RAMASAMY, KR. 1989. **Effect of date of harvest on seed storability and seedborne infection by pathogens in CSH 5 hybrid sorghum**. *Madras Agricultural Journal*, 76: 9, 529-532; 7 ref.

Field trials indicated that seed crops of this cultivar should be harvested at c. 45 d after half-bloom in order to obtain seed with maximum storability and the least contamination by seedborne fungi.

277 RAO, VK. 1991. **Effect of certain indigenous plant materials on grain mycoflora of sorghum during storage**. *Indian Journal of Mycology and Plant Pathology*, 21: 3, 268-269.

278 SHAH, SE; MARIAPPAN, V. 1990. **Effect of seed dressing fungicides on the storage and viability**