EFFECT OF MICROBIAL FERMENTATION ON PESTICIDES RESIDUES IN MILK

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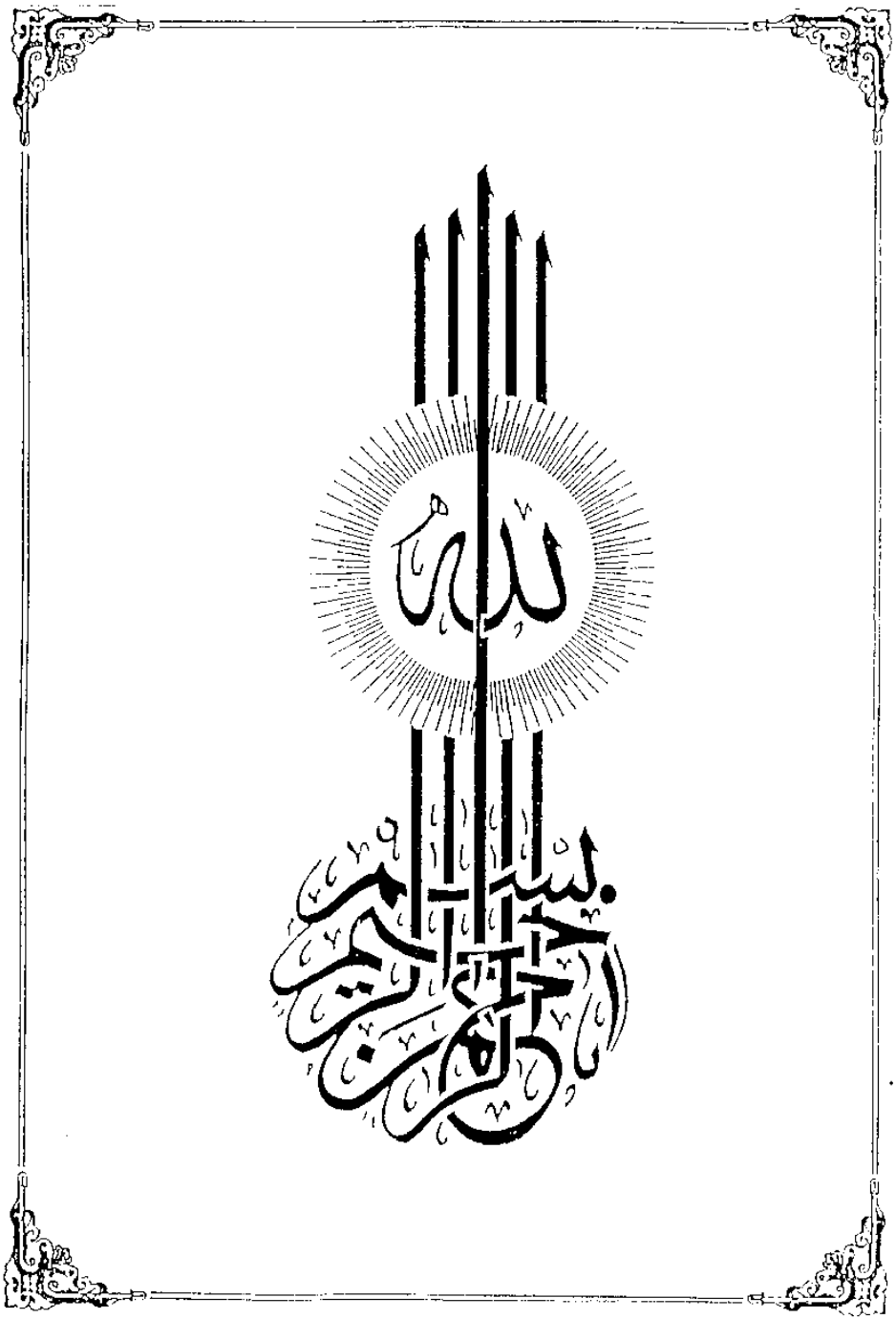

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C O N T E N T S

INTRODUCTION

Food contamination with pesticides has lately been quite a contemporary problem to producers and manufacturers, standard institutions and relevant quality control laboratories as well as public health authorities. The widely spread range of continuously developing insecticides has been regularly reported as one of the most detrimental agents to human health, cancer diseases in particular and other hygienic hazards.

Many workers had detected several pesticide types in liquid milk and dairy products which could not be ignored as vital basic food stuff for children and adults (Hesse et al, 1984; Lucisano et al, 1982; Luck, 1983; Lauro et al, 1984 and Frank et al, 1985).

Locally, El-Alfy (1984), reported the incidence of lindane and endrin in milk taken from cattle kept on or in the surrounding farm where pest control by chemical was applied .

However, several investigators were carried out to restrict suspected milk by eliminating pesticide residues during

the manufacture of some dairy products in which starter cultures and fermentation processes are a common practice (Li, 1970 and El-Alfy, 1981) .

With that in view, this work was conducted to throw some light on the effect of some insecticide residues which may be found, in milk on the growth and activity of lactic bacteria as indicated by acid and acetaldhyde production. Besides, the reflective effect was studied to find out whether the growth of lactic acid bacteria would result any effect on the insecticide levels in milk or not.

REVIEW OF LETERATURE

I. Pesticide residues in milk and dairy products:

1. Pesticide residues in milk:

Most of pesticides are commonly used by farmers to control insect infestaions of various feed crops during the growing season. Residues of pesticides may be present on such feeds (hay,corn,pea,vines, etc.) and hence consumed by dairy cattle. The presence of pesticides in milk , however, does create public health problems. No entirely "safe" pesticides has been developed. The misuse of any one of them in the production of milk (or the manufacture of milk products) may endanger the health of the consumer.

Claborn et al (1956) found that malathion was present in all milk samples taken 5 hours after spraying the dairy cows with 0.5 and 1% malathion ranging from 0.08 to 0.36 ppm. On the other hand, after 24 hours, only traces were present, and the samples taken 3 and 7 days after spraying were free contamination.

Marth and Elliekson (1959) reported that 25 to 62% of market milk samples contained traces or larger amount

of chlorinated hydrocarbon insecticides, DDT was found most frequently. However the organic phosphate insecticides were not found in all samples tested . They stated also, when feeds treated with chlorinated hydrocarbon insecticides were fed to dairy cattle , residues of benzene hexachloride, chlordan , DDT , dieldrin , endrin and toxaphene appeared in the milk . While aldrin , heptachlor and methoxychlor were not detected in significant amounts . However, the maximum levels of insecticide present in milk ranged from 26 ppm for DDT to 0.05 ppm. for endrin .

Frank et al (1970) indicate that residues of DDT , p.p-DDT , p.p-DDE and dieldrin were detected in milk samples collected from different region of Ontario . They showed that DDT plus its mitabolites and dieldrin were present in almost all milk fat tested . Lindane was found in only 8 % of the samples and heptachlor epoxide in 3 % . The average levels of chlorinated insecticide residues in fluid milk were 0.134 ppm. DDT and its metabolites , 0.31 ppm. dieldrin, 0.005 ppm. lindane and 0.001 ppm. heptachlor epoxiede.

Richou et al (1972) reported that the levels of total BHC , a-BHC , heptachlor + heptachlor epoxide , B-BHC and dieldrin + aldrin in milk were 0.29 , 0.16 , 0.10 and

0.09 ppm. respectively .

Polizu and Manolache (1972) stated that average total residues of organochlorine insecticides of over 2ppm. (varying between 1.87 and 2.65 ppm.) was determined in whole milk .

Leshchev et al (1972) showed that when 2 cows sprayed with diazinon (0.2%) and dursban (0.15%), diazinon was excerted in milk for 72 hours and reached a level of 0.65 mg/L in one cow 6 hours after spraying . While dursban was excerted for 96 hours and a reached a level of 0.304 mg /L after 12 hours .

RodriguеZ et al (1972) tested 100 samples of milk (3% fat) for chlorinated hydrocarbon residues . All samples contained 0.02 ppm. DDT and lindane levels ranged from 0.005 to 0.02 ppm .

Hascet and Kerhoas (1972) showed that the concentration of pesticide in milk became stable at 18 ppm. for heptachlor epoxide , 0.8 - 0.9 ppm. for dieldrin and a-BHC , and $\leqslant$ 0.1 ppm. γ - and B-BHC after cows were fed diets containing approximate 0.05 ppm. lindane, heptachlor epoxide

or dieldrin for 113 days .

Sijali and Stricher (1973) showed that the total DDT residues decreased from a mean of 22 µg/kg milk in 1969 to 3.3 and 5 µg/kg milk in 1970 and 1971 , while dieldrin increased from 1.6 to 2.8 and 4 µg/kg milk. The hexachlorobenzene was found in 12 % of samples but neither it nor BHC or heptachlor epoxide were detected in sufficient samples.

Konstantinova et al (1973) noted that 75.5 % of milk samples from cows in(Kirgizia) were contained DDT residues ranging from 0.05 (14.7%) to 5.10 (0.3%) mg/L , and 13% contained BHC at 0.05 (1.7%) to 2 - 3 (1.1%) mg /L.

Vujicic and Bacic (1973) investigated milk samples in Vicvodina (Yogoslavia) between 1966 - 1972 for the contents of dieldrin , DDT , and BHC . Both DDT and BHC increased , while dieldrin remained approximately constant. Results reflect the increased use of the insecticides in agriculture.

Stobiecki and Rycaj (1973) showed that the value for total DDT in milk samples was 0.0137 ppm. and 0.417 ppm. on milk fat basis .

Tolle et al (1974) studied 3600 samples of pasteurized milk and milk products between 1969 and 1973 in Federal Republic of Germany . The results indicated that a reduction of 66% for heptachlor and heptachlor epoxide , 71% for total DDT and nearly 80% for aldrin and dieldrin.

Yamagishi et al (1974) determined BHC isomers, heptachlor epoxide , DDT as well as DDT metabolites and dieldrin in Japanese milk . They found that the total residues decreased from 0.06 ppm. to 0.01 ppm. by the end of the period. The major contaminating insecticides were BHC isomers.

Potter et al (1974) fed the cows by dieldrin-C^{14} at a level equivalent to 0.11 ppm. in their total ratio for three weeks . They reported that the pooled mean residues of C^{14} and dieldrin determined after 15, 17, 19 and 21 days were 0.019 ppm.

Tanahashi and Kuzuya (1974) found that milk samples collected from the University farm contained a-BHC (0.025 ± 0.019) , B-BHC (0.013 ± 0.008), p.p-DDE (0.007 ± 0.002) , p.p-DDT (0.005 ± 0.004) and traces of aldrin , dieldrin and endrin.

Nicolasy et al (1975) classified milk samples containing organochlorine pesticide above the WHO recommended maximum , into three groups which were 6.5% contained excessive a-BHC , 4.8% excessive γ -BHC and 0.7% excessive heptachlor.

Frank et al (1975) reviewed reports concerning pesticide residues levels found in samples of bulk milk through 1967 , 1968- 1969 , 1970 - 1971 and 1973 . They found that DDT and dieldrin were the only pesticides found frequently in milk . Lindane and heptachlor epoxide were occasionally found , but chlordan, endosulfan, endrin and methoxychlor were not detected. The amount of DDT and dieldrin in milk samples declined from 1967 to 1973 . Besides, these data showed a sharp decline in residues of DDT and dieldrin in 1973 copared with earlier samples and a higer percentage of the total DDT residues was present as the metabolites DDE and TDE .

Frok and Froc (1975) studied the contamination of milk with organochlorine insecticides (hexachlorobenzene , a-, γ -and B-HCH , heptachlor epoxide and dieldrin). Contamination inthe milk during first and second location , respectively was ; hexachlorobenzene, 0.67 and 1.97; a-HCH , 0.22