shoots in appreciable amounts (approximately 5 to 6 times) as compared to plants growing on other sites. *A. hystrix* and *A. mutabilis* are also similar examples. Thus, it is concluded from the present study that the grasses on copper deposits accumulate several times greater amounts of the metal than grasses growing in other areas.

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EFFECT OF HCH ISOMERS ON THE DEHYDROGENASE ACTIVITY IN A RED SANDY LOAM SOIL

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Soil dehydrogenase activity is generally considered as a measure of physiological status of soil microflora. This enzyme activity is usually determined in pesticide-treated soil to assess the impact of such chemicals on non-target biota present in the soil. Hexachlorocyclohexane (HCH) is the commonly used insecticide in India and it contains 4 major components α, β, γ and δ isomers. This paper reports the effect of α, β and Tech HCH (mixture of 4 isomers) on the dehydrogenase activity in a red sandy loam soil.

Red sandy loam soil (10 g) was mixed with 1 ml acetone containing 1 mg of individual chemical either α-HCH or β-HCH or Tech HCH (composition α 70%, β 7.5%) γ 13.5% and δ 3.5%). Control soil was mixed with 1 ml of acetone. Soil samples were then poured into test tubes, stoppered and incubated at 30° C and at 60% water holding capacity of the soil (2.5 ml). Dehydrogenase activity in triplicate of each treatment was determined by the reduction of triphenyl tetrazolium chloride (TTC) to formazan. One ml of 4% aqueous solution of TTC and 100 mg of $CaCO_3$ were added to the soil at the end of the desired incubation period and after thorough mixing, the contents were maintained further for a period of 24 hr at 30° C in the dark. Formazan formed was then extracted into methanol and colorimetrically estimated[1].

Effect of HCH isomers on soil dehydrogenase activity is given in table 1. A phenomenal decrease in TTC reduction was noticed in the presence of test chemicals during the entire period of 30 days study. In the control sample, the maximum activity was observed on day 10; but in HCH added soils activity peaks appeared on different days. Tech. HCH caused a significant drop in formazan formation and at every sampling interval it was within 10% of the control value. As compared to individual isomer-treated samples, Tech HCH treated soil showed the least dehydrogenase activity which persisted throughout the duration of the experiment. This may be due to the presence of various isomers in the tech HCH and also due to each isomer bringing about either quick or slow suppression of the enzyme activity. Similar inhibitory effect of commercial formulation of HCH on dehydrogenase activity in flooded soil was reported by Chendrayan *et al*[2].

TABLE 1

Effect of HCH isomers on soil dehydrogenase activity

Treatment	Formazan (mg/10 g/24 hr) days of incubation 4	10	20	30
Nil	2.50	3.17	2.76	2.66
Tech HCH	0.10	0.14	0.19	0.24
α-HCH	0.80	0.54	0.19	0.10
β-HCH	0.24	0.59	0.78	0.95

Among the isomers studied, β-HCH had less inhibitory effect on dehydrogenase activity than the α-isomer. Reduction of TTC in β-HCH containing soil was slow in the beginning which gradually increased to attain the rate 4 times higher in 4 weeks. This is probably due to the rapid transformation of β-isomer to non-toxic component in the soil. On the contrary, in the presence of α-HCH, accumulation of formazan decreased with time from 0.8 mg (day 4) to 0.1 mg (day 30) during the month long measurements indicating that the α-isomer was converted into more toxic intermediate as the incubation continued. Inhibitory effect of α and β-HCH on dehydrogenase activity as revealed in the present study confirms the results of Bollen *et al.*[3] who reported decrease in the formation of nitrates in clay adobe soil and also decrease in the number of molds in dextrose added soil treated with 1000 ppm of α and β forms of HCH. The above findings indicate the deleterious effect of HCH isomers on non-target soil microorganisms. These apart, it is established that α-HCH has oncogenic effect in mice[4] and β-HCH has chronic and cumulative toxic effect in mammals[5]. In view of these results and recalcitrant nature of HCH components and also in view of the increasing use of HCH in this country, there is an urgent need for minimising residues of HCH in the environment.

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JAUNDICE STALK ROT—A NEW DISEASE PROBLEM OF MAIZE

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As many as 11 pathogens (three bacterial and eight fungal) are known to incite stalk rot diseases in maize in India[1]. In recent years, a stalk rot has been found to be widely prevalent in northern maize-growing regions (Uttar Pradesh, Delhi, Rajasthan, Madhya Pradesh, etc.). The disease severity appears to be high in situations where moisture has been inadequate during and after grain formation stage. During surveys, the incidence has been found to range from 3% to as much as 15% or even more.

The disease becomes apparent in the post-flowering phase of the crop. The most notable feature is premature drying of plants. The rind on the stalk becomes highly discoloured—from a healthy green to dirty scarlet or jaundice yellow ('brownish ochrey yellow inclining to dirty green'). The leaves of the affected plants show early drying, assume grayish green to straw colour and become flabby and lax. The stalks become considerably weakened and on longitudinal splicing show evidence of extensive tissue disintegration of the crown region accompanied by rotting of adventitious roots around the crown and of the brace roots higher up (figure 1). Extensive browning or blackening of the roots indicating their diseased condition becomes easily apparent. The stele in the roots, rots completely leaving the bare cortex as an empty shell which easily gets macerated. The pith in the crown region becomes completely disorganised. As a result of the collapse of the pith parenchyma, hollow elongate cavities develop in the crown region as also in the adjacent internodes. The fibro-vascular bundles apparently appear to be unaffected (figure 1). The inner portion of the rind because of the rot in the pith not only becomes exposed but also assumes the same dirty scarlet to jaundice yellow hue apparent on the outside.

The first two or three nodes above the ground level also show evidence of infection. Infected nodes are easy to scratch/scrap in comparison to healthy ones. Brace roots, if they develop, also get infected. But in cases of early infection, brace root formation may get suppressed.

Isolations have shown consistent association of a species of *Exserohilum* identical to *E. halodes* (Drechs.)[2].

Colonies on Potato-dextrose-agar at first creamish to dingy grey which later turn sooty or grayish black, velvety later powdery with spore formation. *Conidiophores* macronematous, mononematous, usually bifurcate, flexuous, geniculate, pale straw to golden brown, smooth upto 270 um long and 5–9 um wide (figure 2c). *Conidia* (figure 2a–e) solitary, acropleurogeneous, mostly straight, rarely rostrate (figure 2a), cylindrical, with 4 to 10 cells; end cells demarcated by thick dark septa and the remaining ones by distosepta; end cells paler and the intermediate ones golden brown, 30–100 x 11–19 μm; the protuberant hilum mostly located centrally but occasionally positioned eccentrically.