Clopyralid Uptake of Contaminated Compost-Fertilised Corn

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Key words : clopyralid , compost , corn , LC/MS/MS analysis

Introduction It has been reported (Sato , 2006) that the cases uncertain cause abnormal growth in horticultural crops (e .g . . tomato eggplant) is generated . In the present investigation , clopyralid (3 ,6-dichloropyridine-2-carboxylic acid , Figure 1) was detected in cow excrement compost and it's materials feeds . Clopyralid is not registered as an agricultural chemical in Japan . It is uncertain how the chemical was detected in Japan despite not being used . Graminaceous plants have low sensitivity for clopyralid . So , there is the possibility of circulation in the food chain (i .e . imported feed-cattle-fescue-compost-corn) . To clarify the likelihood of the circulation , the effect of fertilizing a clopyralid-contaminated compost on the clopyralid uptake of corn was investigated someone two different soil types .

Materials and method The corn seed was sown in the plastic pots (L560 mm , S260 mm , H170 mm) filled with the soil , compost and activated carbon (Wako Pure Chemical Industries , Ltd Osaka , Japan) . The details are summarized in Table 1 (one seed per pot , with each treatment being performed in triplicate) . The concentration of clopyralid in the compost was 73 μg/kg . Corn was grown in the greenhouse for 65 days , being kept at 20-30℃ . Sampling was carried out just before the heading stage at least 5 cm above the soil . Corn samples were cut at 5-10 cm , mixed , and the 30 g of FM were used for the clopyralid quantified analysis by LC/MS/MS .

Table 1 *Experiment treatments for measuring uptake of clopyralid from the soil to the corn .*

No .	soil type	soil amount (kg/pot)	clopyralid-contaminated compost amount (t/10a)	activated carbon amount (t/10a)
1	andosol	20	0	0
2	andosol	20	3	0
3	andosol	20	10	0
4	andosol	20	10	1
5	sandy soil	20	10	0

Results and discussion The results of the uptake experiment are shown in Figure 1 . Clopyralid was not detected (< 2 ng/g FM) in the corn grown in soil without clopyralid contaminated compost (T1) . This result showed that there was uptake of clopyralid via air . Clopyralid was detected in the corn grown used clopyralid contaminated compost for fertilizer (T2-T5) . When compared to T2 , the amount of clopyralid in the corn was 2 .3 times higher in T3 . Since T3 applied 3 .3 times as much clopyralid as T2 , it would suggest that the amount of clopyralid in the corn is dependant on the amount of clopyralid-contaminated compost , at the concentration level used here . The addition of active carbon (T4) lowered the amount of clopyralid uptake in the corn relative to T3 . The amount of clopyralid in the corn grown in the sandy soil (T5) was much higher than that in andosol (3) . Two causes of this are conceivable : 1) the difference in the adsorption ability of the soil , and 2) the difference in the activity of microorganisms in soil that break down clopyralid .

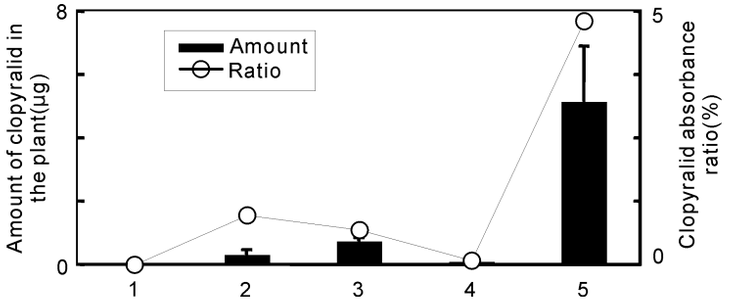

Figure 1 *Amount of clopyralid in the corn (bar ; left scale) . Ratio of uptaked clopyralid (sequential line ; right scale) . Errar bars shows standard deviation .*

Conclusion The uptake of clopyralid to corn was dependant on compast fertilization rates and the nature of the soil . Thus , the possibility of the circulation is also varying according to the nature of the soil .