

CARBOFURAN REMOVAL FROM SOIL BY
SUPPLEMENTATION WITH AGRICULTURAL RESIDUES

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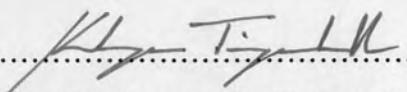
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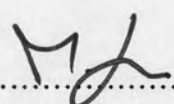
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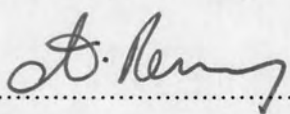
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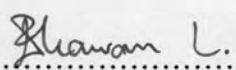
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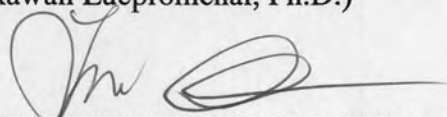
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สุรีย์วัลย์ สิทธิจันดา : การกำจัดคาร์โบฟูรานในดินโดยการเติมวัสดุเหลือทิ้งทางการเกษตร (CARBOFURAN REMOVAL FROM SOIL BY SUPPLEMENTATION WITH AGRICULTURAL RESIDUES) อ. ที่ปรึกษา: รศ.ดร. อลิศรา เรืองแสง, 120 หน้า.

งานวิจัยนี้ศึกษาผลของอินทรีย์วัตถุ ได้แก่ ฟางข้าว (RS) กากมันสำปะหลัง (CS) ชังข้าวโพด (CC) ชีวแห้ง (CM) ปุ๋ยหมัก (CP) กากน้ำตาล (ML) กลูโคส (GL) และอนินทรีย์วัตถุ ต่อการบำบัดคาร์โบฟูรานในดิน และในดินที่ผ่านการบ่ม ที่ความเข้มข้นเริ่มต้นคาร์โบฟูรานในดินเท่ากับ 50 มก/กก ผลการทดลองพบว่า การเติมฟางข้าวที่อัตรา 1.5% ช่วยกระตุ้นจุลินทรีย์ประจำถิ่นได้อย่างมีประสิทธิภาพ โดยค่าครึ่งชีวิต ($t_{1/2}$) ของคาร์โบฟูรานในดินสั้นที่สุด เท่ากับ 7 วัน และมีกิจกรรมของจุลินทรีย์ในระดับสูง ส่วนการเติม CP และ CM มีผลยับยั้งกิจกรรมของจุลินทรีย์ โดยพบว่ากิจกรรมของเอ็นไซม์ดีไฮโดรจีเนสมีค่าลดลง และประสิทธิภาพการย่อยสลายคาร์โบฟูรานในดินอยู่ในระดับต่ำ การเติม GL และ ML ที่ระดับ 1.0 ถึง 5.0% มีผลทำให้ประสิทธิภาพการย่อยสลายคาร์โบฟูรานในดินต่ำลง แต่มีกิจกรรมของจุลินทรีย์เพิ่มขึ้น แสดงให้เห็นว่าจุลินทรีย์สามารถใช้ GL และ ML เป็นแหล่งพลังงานได้ดีกว่าคาร์โบฟูราน การเติมแหล่งอินทรีย์วัตถุมีผลยับยั้งความสามารถในการย่อยสลายคาร์โบฟูราน และกิจกรรมของจุลินทรีย์ประจำถิ่น โดยให้ค่าครึ่งชีวิตอยู่ในช่วง 20 ถึง 25 วัน การเติมฟางข้าวที่ระดับ 1.5% และแหล่งอินทรีย์วัตถุปริมาณ 1 มล ในดินที่ผ่านการบ่ม ช่วยเพิ่มประสิทธิภาพการย่อยสลายคาร์โบฟูราน และกิจกรรมของจุลินทรีย์ประจำถิ่น ในดินที่ผ่านการบ่ม จากการศึกษาจลนพลศาสตร์การเจริญของกลุ่มจุลินทรีย์ในดินที่ผ่านการกระตุ้นด้วยฟางข้าวที่ระดับ 1.5% พบว่าการใช้เทคนิคการกระตุ้นจุลินทรีย์ในการบำบัดคาร์โบฟูรานควรจะทำที่ระดับความเข้มข้นของคาร์โบฟูรานต่ำกว่า 13.23 ลิตร/กก ดิน เพื่อให้เกิดประสิทธิภาพในการใช้เทคนิคกระตุ้นจุลินทรีย์โดยวัสดุเหลือทิ้งทางการเกษตรในการบำบัดคาร์โบฟูราน

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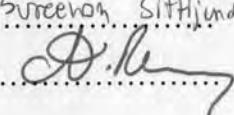
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This research investigated the effects of organic amendments i.e., rice straw (RS), cassava pulp (CS), cattle manure (CM), compost (CP), corn cob (CC), glucose (GL), and molasses (ML) and inorganic amendment on removal of carbofuran from soil and aged soil. Initial carbofuran concentration at 50 mg/kg soil was spiked into soil microcosm. Results showed that 1.5% RS effectively stimulated indigenous microorganisms indicating by the shortest $t_{1/2}$ of carbofuran of 7 days and high microbial activity. CP and CM were found to inhibit microbial activity suggesting by a decrease in dehydrogenase activity and a low carbofuran degradation. GL and ML at high load of 1.0% to 5.0% were more favorable to be used as C-source for indigenous microorganisms, therefore there was low carbofuran degraded in soil amended with GL and ML but there was high microbial activity. Inorganic amendment was found to inhibit carbofuran degradation as well as microbial activities in soil with $t_{1/2}$ of 20-21 days. Addition of 1.5% RS or 1 mL of inorganic amendment into aged soil improved carbofuran degradation ability and microbial activities of indigenous microorganisms. Growth kinetic analysis of carbofuran degraders obtained from 1.5% RS stimulated soil indicated that carbofuran concentration in the contaminated site should be lower than 17.88 mg/L which corresponds to 13.23 L/kg soil, based upon K_d value of 0.74 in our soil sample, in order to obtain an effective biostimulation process by indigenous carbofuran degraders in soil sample used in this study.

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Advisor's signature... 

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