



JULY 2015

CCA EXAMINER EXAM

CERTIFIED CROP ADVISER – CONTINUING
EDUCATION SELF-STUDY EXAMINATION



Detection and degradation of organic contaminants in an agricultural soil amended with alkaline treated biosolids

DIRECTIONS

1. Read the self-study exam carefully.
2. Answer the questions to this self-study exam by circling the best answer for each question.
3. Complete the self-study exam registration form.
4. Enclose a payment for processing fees of \$14.95 (Cdn) for CAAR Members, and \$24.95 (Cdn) for non-members, plus GST or HST.
5. Mail your self-study exam and payment to:
The CCA Self-Study Exam
c/o Canadian Association of Agri-Retailers
628-70 Arthur St., Winnipeg, MB R3B 1G7

SELF-STUDY EXAM:

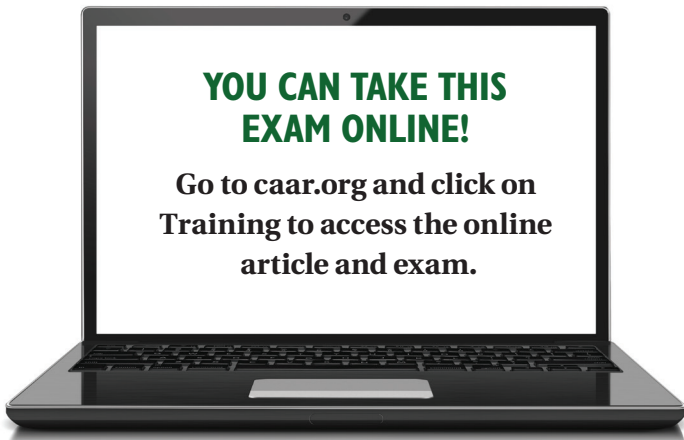
After reading the pre-approved self-study article, please answer this 10-question exam and return it to CAAR. An exam score of 70 per cent or higher will earn you one credit in Pest Management.

1. What is the definition of PPCP's and why are they a concern?

- a. Protection and personal care products that find their way into our water bodies and environment and may cause ecological harm
- b. Pharmaceuticals and products that find their way into biosolids produced from wastewater treatment processes
- c. Pharmaceuticals and personal care products that find their way into biosolids produced from wastewater treatment processes and may cause ecological harm
- d. Petroleum and pharmaceutical care products that find their way into biosolids produced from wastewater treatment processes and may cause ecological harm

2. Why could the presence of organic contaminants in biosolids in the soil be a concern for agriculture?

- a. Organic biosolid contaminants can leach into groundwater after rainfall or during irrigation and some plants have been show to take up these contaminants in their roots, shoots and leaves
- b. Earthworms have been shown to accumulate PPCP's
- c. Application of biosolids to soil is a practice that will continue to grow under the current policy framework in many countries and as the world population grows.
- d. All of the above



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3. **The Canadian Council of Ministers of the Environment conducted a survey of emerging contaminants in biosolids produced at eleven Wastewater Treatment Plants (WWTPs) across Canada. Which contaminants were detected in >95% of all samples.**
 - a. Triclosan, triclocarban, and carbamazepine
 - b. Phenanthrene, triclosan
 - c. There were no contaminants identified
 - d. Phenanthrene, triclocarban, triclosan

4. **In the field plots, what crop was planted the previous year and the year of the analysis?**
 - a. Soybeans then to corn
 - b. Corn then to soybeans
 - c. There was nothing planted the first year, then corn was planted
 - d. Wheat then to corn

5. **What is the objective of this study?**
 - a. To determine which contaminants are present in earthworms in laboratory and field conditions after receiving increasing rates of alkaline treated biosolid (ATB) applications
 - b. To detect and monitor organic contaminant concentrations (particularly triclosan and phenanthrene) in an agricultural soil receiving increasing rates of alkaline treated biosolid (ATB) applications under laboratory and field conditions
 - c. To detect and monitor organic contaminant concentrations (particularly triclosan and phenanthrene) in an agricultural soil receiving increasing rates of alkaline treated biosolid (ATB) applications under laboratory conditions
 - d. To determine which contaminants are present in soil in laboratory and field conditions after receiving increasing rates of alkaline treated biosolid (ATB) applications

6. **When do phenanthrene concentrations decrease?**
 - a. When approximately one third of the CO₂ has been evolved
 - b. It does not decrease
 - c. When approximately one half of the CO₂ has been evolved
 - d. The phenanthrene concentration increased in this study

7. **In this study, it was shown that fall-applied biosolids may persist over winter, however, triclosan levels**
 - a. Decreased over the warmer summer months
 - b. Decreased over the following year
 - c. Increased over the warmer summer months
 - d. Decreased over the cooler summer months

8. **Of the contaminants assessed in the soil samples which one was only detected in field-based soil samples?**
 - a. Triclocarban
 - b. Triclosan
 - c. Phenanthrene
 - d. Carbamazepine

9. **What happened to the concentration of triclosan under ideal conditions (laboratory) in this study?**
 - a. It ranged from 58 ng g⁻¹ post-application to 20 ng g⁻¹ at the end of the study, representing a 78% decrease over 4 months
 - b. It ranged from 92 ng g⁻¹ post-application to 20 ng g⁻¹ at the end of the study, representing a 78% decrease over 4 months
 - c. It ranged from 100 ng g⁻¹ post-application to 40 ng g⁻¹ at the end of the study, representing a 70% decrease over 4 months
 - d. It ranged from 120 ng g⁻¹ post-application to 20 ng g⁻¹ at the end of the study, representing a 95% decrease over 4 months

10. **What are some of the results from this study?**
 - a. Fall-applied biosolids may persist overwinter, but removal of triclosan became apparent following the warmer summer months
 - b. There is a relationship between the triclosan concentration and the cumulative evolved CO₂-C from biosolid-amended soil. This supports the idea of aerobic microbial degradation as a likely removal pathway for triclosan.
 - c. In the field study, triclosan was the only analyte detected in soil samples
 - d. All of the above

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SELF STUDY EXAM REGISTRATION FORM:

(Please note: You must have your CCA Certification number on the form in order to be eligible for the CEU.)

CAAR Member Non-Member

Member Company: _____ Member Location (Town, Prov.): _____

Name: _____ Company: _____

Address: _____ City: _____ Province: _____ Postal Code: _____

CCA Certification #: _____

Payment Option: Cheque enclosed (Made payable to the Canadian Association of Agri-Retailers) VISA MasterCard

Credit Card #: _____ Expiration Date: _____

Name on Card: _____

I approve payment by credit card and certify that I alone completed this self-study course, recognizing that an ethics violation may revoke my CCA status.

Signature: _____

EXAM EVALUATION FORM (PLEASE TAKE A MOMENT TO PROVIDE US WITH SOME FEEDBACK ON THIS EXAM):

Rating Scale: 1 = Poor 5 = Excellent

Information presented will be useful in my daily crop advising activities.	1	2	3	4	5
Information was organized and logical.	1	2	3	4	5
Graphics/Tables were appropriate and enhanced my learning.	1	2	3	4	5
This article addressed the stated competency area and performance objective(s).	1	2	3	4	5

Topics I would like to see addressed in future materials: _____

