

Preventing Clubroot

Agricultural Sanitization

Which disinfectants kill resting spores?



What is clubroot?

Clubroot is a serious disease affecting the roots of Brassica crops throughout the world. In Alberta, clubroot became a very serious issue in 2003 when it was discovered in canola fields in the Edmonton area. Since that time, it has spread to thousands of new fields across Alberta and to Saskatchewan, Manitoba, Ontario and North Dakota.

How does it spread

The spread of the pathogen mainly due to infested soil moving on equipment. For example, large amounts of soil infested with resting spores of the clubroot pathogen may get stuck on farm or construction equipment. Hundreds of pounds of soil can travel with one tractor.

Equipment sanitization

Movement on equipment can be prevented by sanitization to reduce or remove risk of infested soil movement. Sanitization involves cleaning to remove soil and plant

debris, and then disinfecting with a chemical that will kill the resting spores of the clubroot pathogen.

What disinfectant should be used?

Since equipment sanitization is an important part of managing the spread of the disease, measuring the effectiveness of chemical disinfectants was also important so that those working in agricultural, construction, power and energy industries would know how to best prevent clubroot spread. To evaluate disinfectants, clubroot spores were exposed to different concentrations of chemical disinfectants for 20 minutes, and then the viability of the spores were determined using a vital stain called “Evans blue”. Of the 24 disinfectants evaluated, seven of them were able to kill > 90% of the spores.

1. The most effective disinfectant was sodium hypochlorite (bleach). It was able to kill nearly 100% of the resting spores at concentrations above 1.7%.
2. The second most effective disinfectant was “Spray Nine” which killed almost 100% of the resting spores. Spray Nine® comes as a ‘ready-to-use’ product and is used undiluted. The product contains ethoxylated C9-C11 alcohols and dipropylene glycol monobutyl ether as active ingredients.
3. The third most effective products were chlorinated degreasers called Adhere NC and Premise Degreaser which killed > 95% of spores at product concentrations of approximately 10%.
4. The fourth most effective product was AES 2500 which achieved 95% spore mortality at product concentrations above 50%. Finally, ethanol and SaniDate could kill > 95% of spores at concentrations of 75% and 90% respectively.

- The most effective disinfectant was 1.7% sodium hypochlorite
- The second most effective disinfectant was Spray Nine® (ready-to-use)
- The third most effective products were chlorinated degreasers called Adhere NC and Premise Degreaser
- The fourth most effective products were AES 2500 and ethanol

These results indicated that sodium hypochlorite bleach (>1.7%) is the most effective. However, if a bleach alternative is desired, Spray Nine is the next best option. Finally, Adhere NC and Premise Degreaser are also good secondary options.

****CAUTION:
CORROSIVENESS OR SURFACE DAMAGE OF THE DISINFECTANTS ON METALS, PLASTICS AND CLOTHING WAS NOT EVALUATED. USE CAUTION, AND AT**

YOUR OWN RISK. ALWAYS FOLLOW LABEL AND SDS DIRECTIONS**

Tips for agricultural sanitization

- If you are under contractual obligation to sanitize, then you must do what is required in the contract.
- If you are not contractually obligated, it's OK if you don't have time to do everything, but it's not OK to do nothing.
- Make a plan and decide how much time you will spend on sanitization. For example,
 - If you only have time for one of the three steps, then choose step 1: knock off loose soil/debris before leaving a field. This will remove a very large amount of risk in a very short amount of time.
 - If you have time to do two steps, then knock off dirt and wash off any remaining mud or clinging soil. Washing equipment is not always fun, and it may take a few hours, but it will remove virtually all the risk of clubroot spreading.
 - If you can disinfect as the final step, it will ensure no clubroot risk is remaining. However, keep in mind that soil cannot be disinfected. Therefore, there is no point applying a disinfectant to equipment, footwear or tools that have not been cleaned.



Tips for disinfecting shoes/tools

- Knock or scrape off any loose dirt from tools or footwear
- Wash off any mud or clinging soil
- Place in a footbath or tool dip containing a disinfectant for 20 min

Tips for working with bleach

- Check the product label for the concentration of sodium hypochlorite in the product
- Dilute the product with tap water to obtain a 2% sodium hypochlorite solution
- Store all bleach solutions in a sealed container in a cool dark place to prevent inactivation by heat or light. When stored in a cool dark place, bleach will maintain its activity for up to 1 year. However, when stored at room temperature, bleach loses about 1% sodium hypochlorite every 100 days. In the cab or bed of truck, its activity would decay much more quickly. Here are some rules of thumb:
 - Bleach solutions stored at 4° C in the dark should be replaced at least once each year
 - Bleach solutions stored at room temperature should be replaced every 2 months
 - Bleach solutions stored in a vehicle or outdoors should be replaced weekly
 - Bleach solutions that have come into contact with soil or organic matter should be replaced immediately.
 - When in doubt regarding the activity of a bleach solution – prepare a fresh solution, or use a chlorine test strip to obtain an estimate of its effectiveness.
 - Most microorganisms can be killed with a 0.5% bleach solution, so a 2% bleach is significantly more concentrated than normal “household bleach” products. Therefore 2% bleach is potentially harmful to the applicator. Contact with skin or inhalation of fumes should be avoided. Do not mix bleach with other chemicals. Always follow label and SDS recommendations for PPE and safe handling, storage and disposal.