# Developing a Tool Kit for on-farm monitoring of water quality

**HMGA Sharing Water Technologies**

**February 25, 2015**

SRG
Soil Resource Group

# Objective:

- Develop **PRACTICAL** methods that growers can use to:
  - Track microbial water quality
  - Monitor water treatment system performance
  - Proactively manage water quality through production system

# One more thing to do! - Why?

- **REDUCE RISK**

# Why not rely on only laboratories?

- Frequency – how often and how many?
- Cost?
- Food safety in real time?
- Are treatment systems working?
- Can you find small problems before they become big ones?

# Denitrification woodchip bioreactor

# Plant pathogen removal by bioreactor – DNA Multiscan testing

| Target Organism | Untreated Sump Water | | | | | | | Woodchip Bioreactor Treated | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 22 May 12 | 5 June 12 | 5 July 12 | 1 Aug 12 | 15 Aug 12 | 12 June 13 | 5 Sept 13 | 22 May 12 | 5 June 12 | 5 July 12 | 1 Aug 12 | 15 Aug 12 | 12 June 13 | 5 Sept 13 |
| Botrytis | 2 | 3 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Fusarium | 0 | 1 | 1 | 1 | 2 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| Phytophthora | 0 | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 |
| Pythium | 0 | 5 | 4 | 5 | 3 | 10 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 0 |
| Rhizoctonia | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Olpidium | 0 | 0 | | | | | | | | | | | 0 | 0 |
| Sclerotinia | 0 | 0 | | | | | | | | | | | 0 | 0 |
| Thielaviopsis | 0 | 0 | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Verticillium | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

$175-$225 each

1-2 weeks

# DNA Multiscan testing

| | |
|---|---|
| Site code | F2 |
| Crop | Cut mixed |
| System | Recirculating |
| Treatment | UV |

**Cistern: Untreated water**

**Cistern: Treated water**

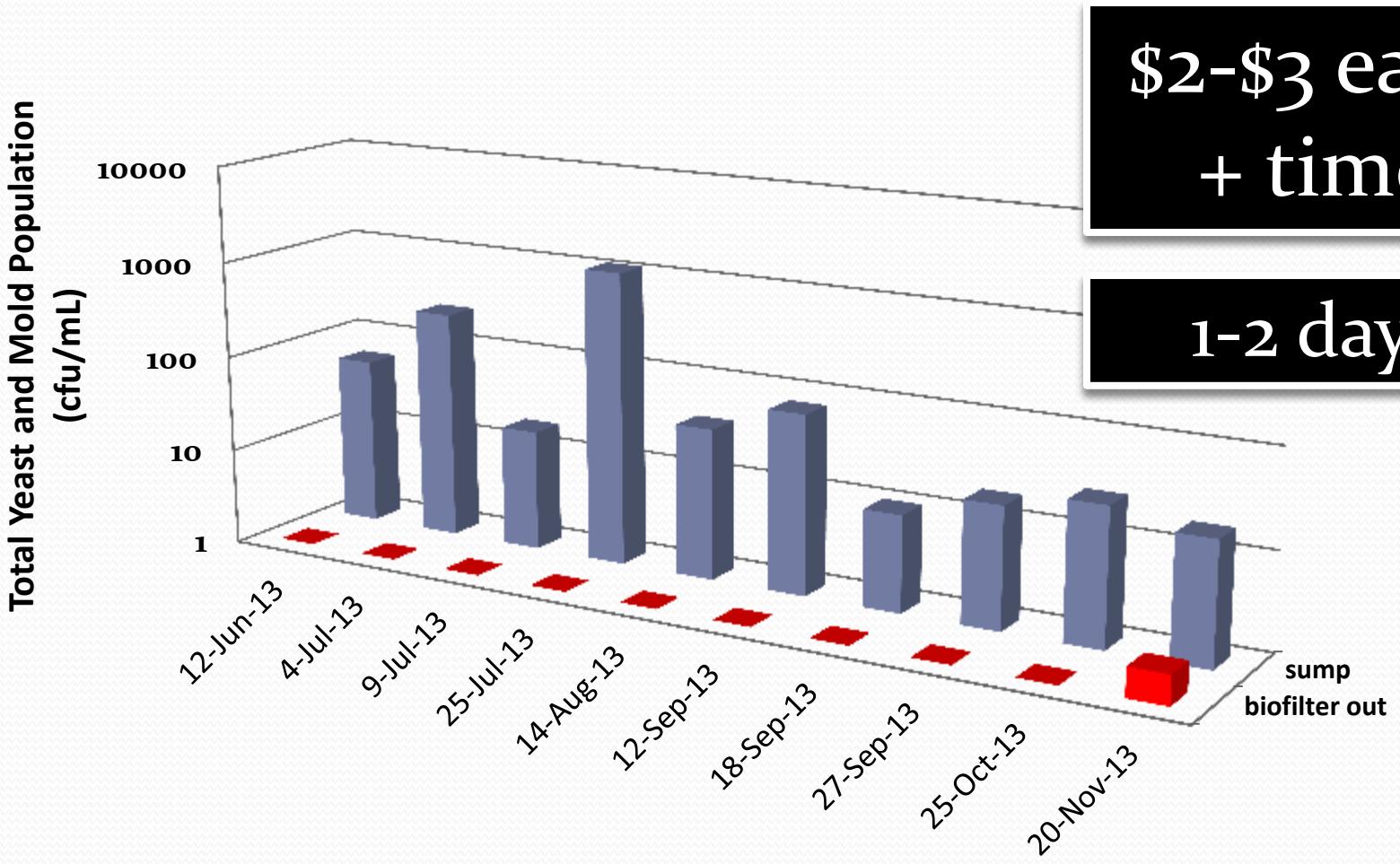
**DNA Multiscan scores**

| | | Leach or Runoff water - untreated | | | | | | Treated | | | | | | Average score reduction (Aug) % |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Sample Code | | F2-3 | F2-3 | F2-3 | F2-3 | F2-3 | Average (August) | F2-4 | F2-4 | F2-4 | F2-4 | F2-4 | Average (August) | |
| Sample Name | | Cistern 1 | Cistern 1 | Cistern 1 | Cistern 1 | Cistern 1 | | Cistern 2 | Cistern 2 | Cistern 2 | Cistern 2 | Cistern 2 | | |
| Sampling Date | | 14-May-12 | 5-Jun-12 | 5-Jul-12 | 1-Aug-12 | 15-Aug-12 | | 14-May-12 | 5-Jun-12 | 5-Jul-12 | 1-Aug-12 | 15-Aug-12 | | |
| Target Organism | Botrytis cinerea | 1 | 0 | 0 | 0 | 0 | 0.00 | 1 | 1 | 0 | 0 | 0 | 0.00 | - |
| | Fusarium oxysporum | 1 | 0 | 0 | 1 | 1 | 1.00 | 0 | 1 | 1 | 1 | 0 | 0.50 | 50 |
| | F. solani | 1 | 0 | 0 | 1 | 1 | 1.00 | 1 | 1 | | | | | 0 |
| | Phytophthora sp. | 1 | 0 | 0 | 1 | 0 | 0.50 | 2 | 0 | | | | | |
| | P. cactorum | 0 | 0 | 0 | 0 | 0 | 0.00 | 0 | 0 | | | | | |
| | P. capsici | 0 | 0 | 0 | 0 | 0 | 0.00 | 0 | 0 | | | | | |
| | P. cinnamomi | 0 | 0 | 0 | 0 | 0 | 0.00 | 0 | 0 | 0 | | | | - |
| | P. cryplogea | 0 | 0 | 0 | 0 | 0 | 0.00 | 0 | 0 | 0 | 0 | 0 | 0.00 | - |
| | P. drechsleri | 0 | 0 | 0 | 0 | 0 | 0.00 | 0 | 0 | 0 | 0 | 0 | 0.00 | - |
| | P. fragariae | 0 | 0 | 0 | 0 | 0 | 0.00 | 0 | 0 | 0 | 0 | 0 | 0.00 | - |
| | P. infestans | 0 | 0 | 0 | 0 | 0 | 0.00 | 0 | 0 | 0 | 0 | 0 | 0.00 | - |
| | P. nicotianae | 0 | 0 | 0 | 0 | 0 | 0.00 | 0 | 0 | 0 | 0 | 0 | 0.00 | - |
| | Pythium sp. | 3 | 1 | 1 | 1 | 1 | 1.00 | 4 | 3 | 1 | 1 | 0 | 0.50 | 50 |
| | P. aphanidermatum | 0 | 0 | 0 | 0 | 0 | 0.00 | 0 | 0 | 0 | 0 | 0 | 0.00 | - |
| | P. dissotocum | 6 | 1 | 2 | 3 | 3 | 3.00 | 6 | 8 | 1 | 1 | 0 | 0.50 | 83 |
| | P. irregulere | 1 | 0 | 0 | 0 | 0 | 0.00 | 0 | 0 | 0 | 0 | 0 | 0.00 | - |
| | P. polymastum | 0 | 0 | 0 | 0 | 0 | 0.00 | 0 | 1 | 0 | 0 | 0 | 0.00 | - |
| | P. sylvaticum | 0 | 0 | 0 | 0 | 0 | 0.00 | 0 | 0 | | | | | |
| | P. ultimum | 1 | 0 | 0 | 0 | 0 | 0.00 | 0 | 0 | | | | | |
| | Rhizoctonia solani | 0 | 0 | 0 | 0 | 0 | 0.00 | 0 | 0 | | | | | |
| | Sclerotinia sp. | 0 | 0 | 0 | 0 | 0 | 0.00 | 0 | 0 | | | | | |
| | Thielaviopsis basicola | 0 | 0 | 0 | 0 | 0 | 0.00 | 0 | 0 | 0 | 0 | 0 | 0.00 | - |
| | Verticillium albo-atrum | 0 | 0 | 0 | 0 | 0 | 0.00 | 0 | 0 | 0 | 0 | 0 | 0.00 | - |
| | Verticillium dahliae | 0 | 0 | 0 | 0 | 0 | 0.00 | 0 | 0 | 0 | 0 | 0 | 0.00 | - |
| | V. dahliae (ver longisporum) | 0 | 0 | 0 | 0 | 0 | 0.00 | 0 | 0 | 0 | 0 | 0 | 0.00 | - |

OOPS !

1-2 weeks

# 3M Petrifilm for yeast & mold

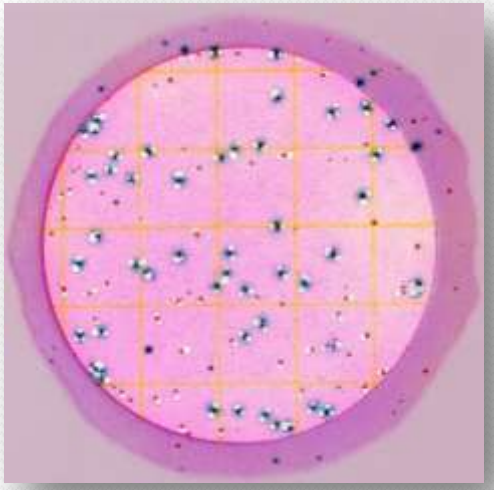



$2-$3 each + time

1-2 days

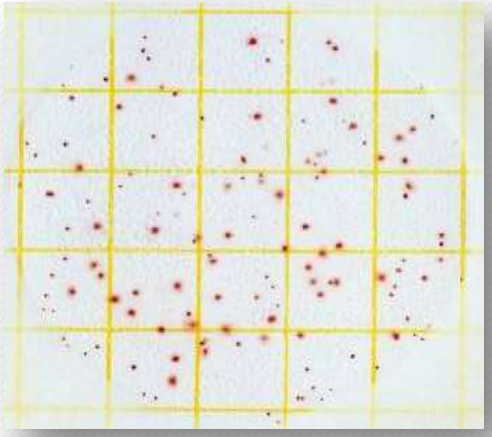
# Food Safety: *E.coli*, Coliforms



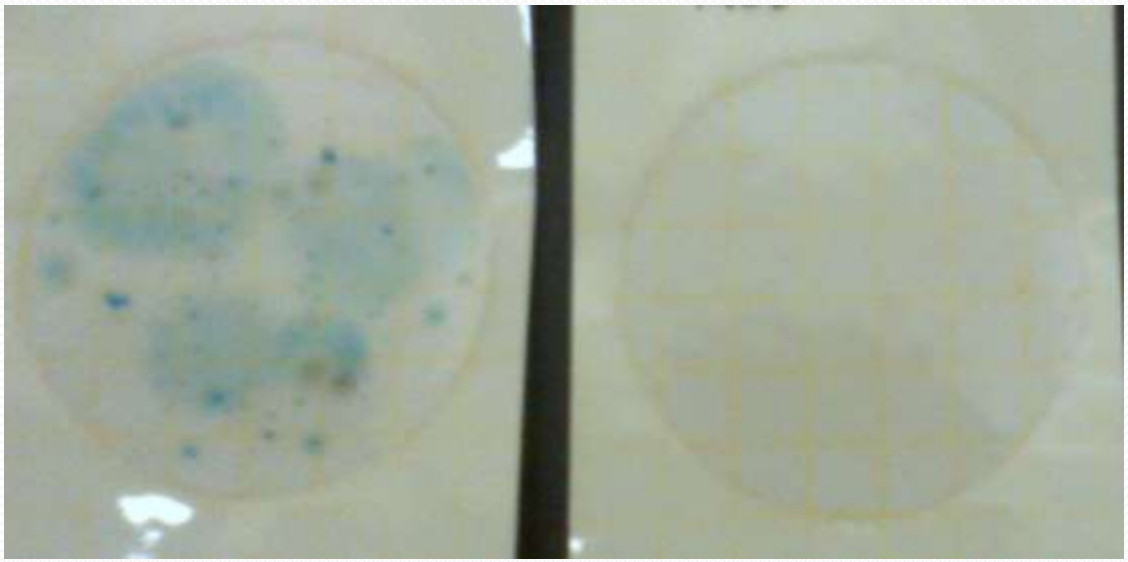


3M Petrifilms

General water quality:
Total aerobic bacteria

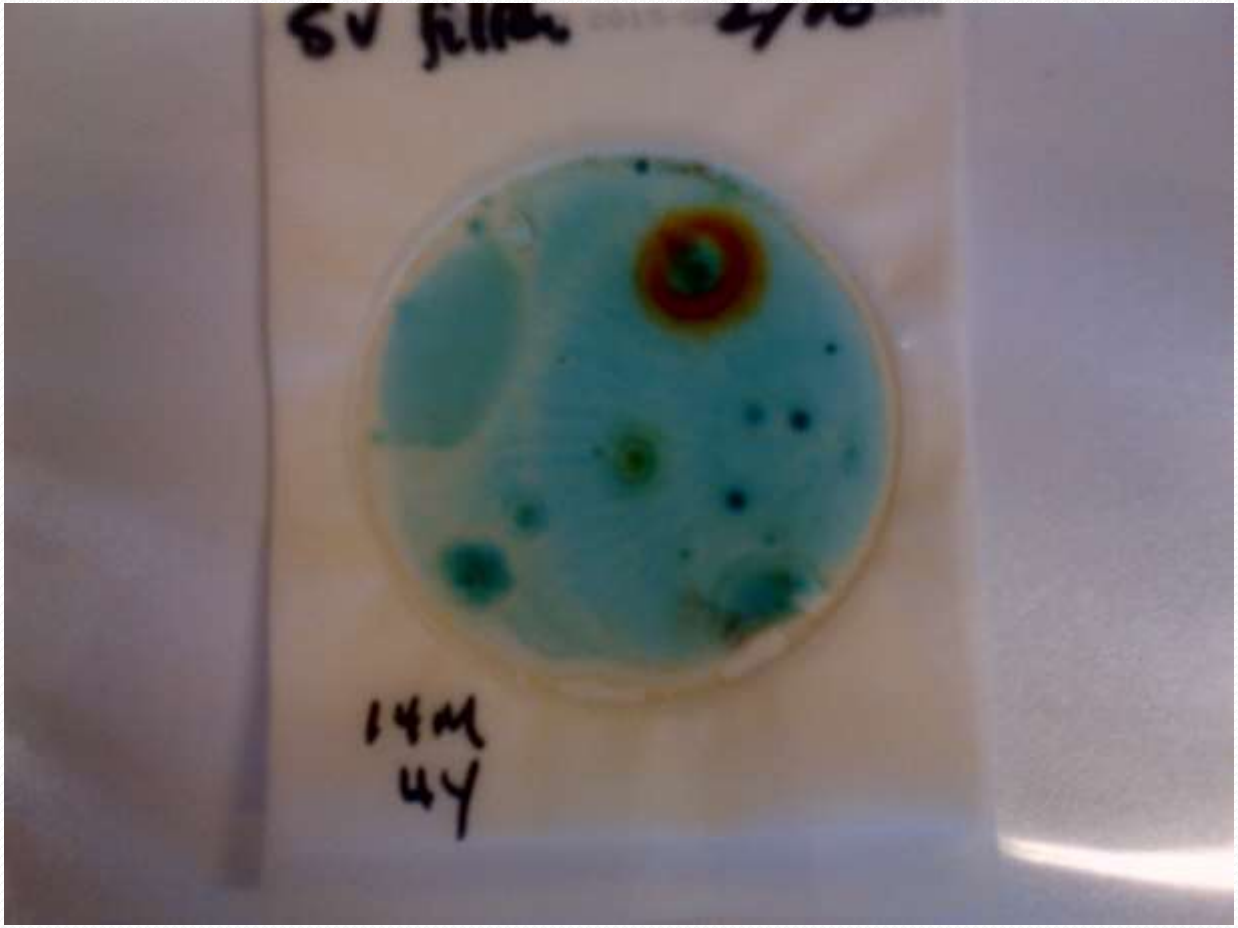


# Plant Pathogens: 3M Petrifilm for Yeast & Mold



Sump Bioreactor

# But – what are they?



# Acknowledgements


- Funding
  - Growing Forward 2 Collaborations
  - Holland Marsh Growers Association
  - Flowers Canada – Ontario


- YOU – Our Growers!

- AND - We are going to need your help