Master Gardeners of Ontario

What's Growing On

Serving Ontario for over 25 Years

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Spring, 2012 **www.mgoi.ca**

In the Beginning

Tom McCavour, Simcoe County

We all know that, in biblical terms, there was quite a bit accomplished on the third day, including the earth and all of the plant life that we know. But in geological terms it took a great deal longer to create that loose top layer of the earth's surface, named soil. How about billions of years of tectonic plates crashing in to each other, volcanoes belching lava and pumice from deep within the earth, glaciers advancing and receding, seas rising and falling, plants and animals living and dying, and in the process creating the stuff we call soil.

As gardeners, we know how the textural triangle works, with clay on the vertical axis and sand on the horizontal axis – plus all the different combinations that create our garden environment. But where did all these ingredients come from and what are they exactly?

Well first of all we can start with clay. This component of soil is formed over long periods of time by the gradual chemical weathering of rocks. Water containing low concentrations of carbonic acid leach

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Let's Put Out the Welcome Mat for Worms

Alexandra Wiens, Prince Edward County

My best friend and partner in garden work is the lowly earthworm. No other creature is a better indicator of garden health. When I begin to work in a new garden, I start by turning over a foot of soil. How many worms do I see? The presence of many earthworms tells me that the soil is rich and full of humus and ready to support all sorts of plants. Earthworms are tireless; they make the industrious ant of fable look like a slacker. Consider the disadvantages they face: they don't have lungs, eyes, legs or teeth. Yet these busy little creatures turn over the entire top layer of soil (6 inches – 15 cm.) every 15 to 20 years or so.

They are also gregarious, apparently, given that one square yard of soil can contain as many as three hundred of them. They lead very busy lives relative to their life span which is about two years for *Lumbricus terrestris* (common earthworm) in the wild.

Worms are hermaphroditic and possess both sets of sex organs. Despite what seems an ideal set-up for self-sufficiency, they need to mate with another worm in order to produce their offspring. The raised band that encircles the worm is actually a

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What's Growing On is the newsletter of the Master Gardeners of Ontario, Inc. It is published 4 times per year in January, April, July, and October.

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through the top cover and work on the rock. There may be a geothermal event to speed up the process, but basically it is long-term weathering and chemical action that does the job.

Next we look at the source of sand. This is all about breaking big rocks into smaller rocks, and smaller rocks into gravel, and gravel into coarse sand, and coarse sand into fine sand. It's mechanical – like mining a quarry. Of course the continuous action of tectonic plates jostling for their final place on earth, glaciers grinding slowly and consistently, backward and forward, wave action and the never-ending water cycle all do their part in producing this ingredient.

Our textural triangle has another junior component. It's called silt. Silt is a granular material, like sand, but it is very fine. When you do your soil texture test, and look at the jar, you find sand at the bottom with the silt sitting on top. It is somewhere between sand and clay and is produced both chemically and mechanically.

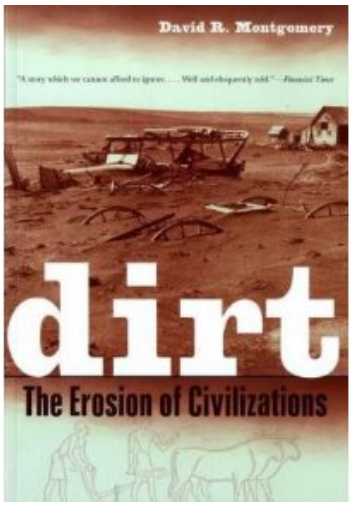
The final name on our textural triangle is loam. This is a complex but very important member of the soil family. Gardeners love it. It has a little bit of everything – sand, silt and clay with lots of nutrients.

However, I have left the best ingredient to the last. If you look at the soil test jar you will find a little layer of humus at the top. This stuff is the difference between a good garden and an excellent garden. It helps to retain moisture and the worms and bacteria love it.

So stick around folks - the soil can only get better!

Book Review – *DIRT: The Erosion of Civilizations*, by David Montgomery

Edythe Falconer, Ottawa



David Montgomery guides us along a path riddled with collateral damage where short-term expediency frequently trumps sustainability. His book is dense with detail, yet eminently readable. From ancient times and into the present this is not an optimistic tale.

He reveals a perennial pattern of soil mismanagement that can contribute to serious decline and eventual cultural collapse. This quiet process often goes unnoticed until it's too late. Valley civilizations emerge and thrive, crops are good and population increases. Then, with more agricultural land needed, slopes are cleared. With loss of leaves to enrich and roots to stabilize, soil loses fertility and erodes down slopes. Lowland farmers may benefit from slope erosion. However slope farms become less productive and the gap between rich and poor widens. Elsewhere land meant to support prairie grass is plowed and exposed to the elements, no longer stabilized by deep roots of the original ground cover. Land that would benefit from sound dry land farming practices is irrigated until it becomes saline and useless – for centuries.

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Worms from page 1

carrying case for its eggs. Once the eggs are formed the band migrates along the worm's body and is shed and the eggs are left to hatch.

All this may be interesting, but what is the role of earthworms in the garden? After all, we have fertilized the soil and have been watering. We bought good plants from the nursery and planted top quality seed. So why do we need worms in the garden?

I have already mentioned the amount of burrowing they do. In addition to aerating the soil they leave behind their castings. This worm 'poop' is the best and richest of all fertilizers. Nothing else will help produce lush, healthy plants to the same degree.

Unfortunately worms need moist soil to survive. Many problems that we experience with our lawns are because they are inhospitable to earthworms. Most lawn areas get full sun exposure in the summer. This hot, dry environment is not earthworm 'friendly'. Excessively sandy garden soil will not support worms either. During periods of drought worms recede deeply into their burrows, which can be up to six feet deep. They also enjoy interior decoration as they pull leaves into the ground for the winter months to line those same burrows and keep them cozy. A mucous on their skin keeps the burrow from collapsing by adding structure.

Take a look at your garden this fall – turn over a few spades of earth; do you see worms? Does the soil seem rich, dark and moist? Or is it looking dry and friable?

Inviting in a good population of worms is easy. See that they have a moist, well-mulched habitat with plenty of decaying matter. Fall is an excellent time to empty the compost bin and spread the results on the areas where annuals have been removed. If you have access to mushroom compost or some manure you can top-dress the beds with that as well. The compost provides perfect food for the earthworms. The manure will enrich the soil with nutrients. Turn the materials under in the spring to ensure a moist environment. The earthworms will arrive like houseguests and stay to eat. But unlike the unexpected houseguest, you will never want them to leave!

Do Not Dig Too Deep

Janey Marshall, Halton

As avid gardeners we know the importance of maintaining and improving soil tilth to optimize plant vigour. We aim for a rich loamy soil texture - we mulch, compost and cultivate until we achieve that dark, moist, crumbly cake-like texture that plants thrive in. We should keep in mind, however, that soil structure is equally important to the health of our plants and eco-system. Often, however, the various tactics we employ to improve soil texture can, in the long term, compromise our soil's structure – leading to decreased biodiversity in the soil which in turn intensifies horticultural dependence on human intervention.

Soil has 5 basic layers (horizons O, A, B, C, and R). Of greatest concern to us as gardeners are the eluviation horizons, O and A. But, when we add and cultivate compost and other organic material into these layers to improve texture, are we also improving soil structure? In the short term it might seem to enhance moisture retention, porosity, and texture – but I would argue that in many instances we may actually be doing as much harm as good when it comes to soil structure and fitness.

When traditional vigorous soil conditioning practices are applied regularly, different horizons often become merged or blended together. As we cultivate we often end up with a homogeneous O and A horizon, but in some instances over-zealous soil amenders might even dig deeper and disrupt the B horizon! This can lead to an impermeable hardpan and can disturb microbial systems critical in the natural formation of humus. Furthermore, it can reduce the size of macropores – or worse, render the soil uniformly porous (making it perhaps ideal for seed beds, but little else). Over-zealous amending of the soil can even reduce habitable ecosystems for soil-dwelling organisms, many of which are instrumental to overall soil vitality.

This means that instead of vigorously cultivating compost deep into our gardens, we should instead only be churning up and working in compost and spent plant material into just the first couple of inches – leaving the vast majority of the bed largely undisturbed. This will give the soil ecosystem an opportunity to naturally turn organic material into humus.

Another suggestion is to plant 'cover' plants to provide natural protection from erosion, desiccation and pests. Annuals, edible plants (veggies/fruit/herbs), and short lived bedding plants are ideal additions. There is no need to remove them after the season either – simply let them become a natural part of your soil's O horizon.

These practices and tips are but a few ways to improve soil structure. There are many other non-conventional practices that will improve soil tilth without compromising soil

Ontario Horticultural Association and Master Gardeners of Ontario Inc.

Working Together

Here is the latest issue OHA's newsletter the Trillium.

Events

Peterborough Garden Show

April 5 – April 7 – Peterborough Garden Show at the Evinrude Centre, 911 Monaghan Road, Peterborough. Details at www.peterboroughgardens.ca

April 12 – 15 – International Home and Garden Show – Successful Gardening Show, at 6900 Airport Road at Derry Road, Toronto.

April 17 – 7:00 – 9:00 p.m. – Norfolk County presents 'A Garden For All Seasons: The Making of a Country Garden' with Yvonne Cunnington at Eising Greenhouses and Garden Centre, 814 Cockshutt Road, Simcoe. All welcome. Free admission. For more info contact norfolkmg@yahoo.com.

April 19 at 7:30 p. m. – Muskoka Parry Sound Master Gardeners present Carson Arthur –"How Green is Your Backyard?" at the Rene M. Caisse Memorial Theatre in Bracebridge. Tickets $12.00 in advance, $15.00 at the door. Door prizes and Silent Auction. For more information call 705-645-0004

April 22 – 9:30 a.m. – 3:00 p.m. (or until plants are sold out) – Toronto Rhododendron Society Plant at Toronto Botanical Gardens (777 Lawrence Ave E.) featuring healthy, Ontario-grown plants and a selection of locally grown companion perennial from Chalk Lake Greenhouses. For more information contact Marion Moore at 416-480-9889

May 6, 12:00 to 4:00 p.m. – Hardy Plant Sale at Toronto Botanical Garden, Floral Hall, 777 Lawrence Avenue East. Shrubs, perennials, alpines and Vendors. More Information at www.onrockgarden.com/plantsale

May 19 at 9:00 a.m. LSS Plant Sale at Newmarket Church of Christ, 230 Davis Drive (1/2 mi east of Yonge St. in Newmarket)

May 12, 9 a.m. until noon – Guelph and Wellington County Annual Plant Sale – at the R.J. Hilton Centre on College Avenue East in Guelph. More information at mgguelph@hotmail.com

May 19 – 9:00 a.m. – Noon – Prince Edward County MG Annual Plant Sale at the Metro Parking Lot, Main Street, Picton. Contact 613-476-1473

May 25 at 7:00 p.m. at the Howard Johnson Hotel located at 50 Brady St in Sudbury, 'An Evening with Denis Flanagan'. Tickets are $12.00 in advance or $15.00 at the door. For more information contact ccarr@isys.ca

May 26 – 8:00 a.m. – Noon at 1141 Blue Line Road, Simcoe. Norfolk County Plant Sale.

May 26 – 9:30 a.m. to 4:00 p.m. at Market Square. Sudbury Gardening Festival and the Annual Perennial Plant Sale. For more information www.sudburygardeningfestival.ca

June 16 – 17 – 10:00 a.m. – 4:00 p.m. – The 6th Annual Oshawa Peony Festival at the Oshawa Valley Botanical Gardens, 155 Arena Street, Oshawa. For more information www.oshawa.ca/tourism/peony/peony-festival.asp Be sure to stop by the Durham MG Advice Clinic.

June 23 – 10:00 a.m. – 3:00 p.m. 'A Day Of Wine And Roses' – Sponsored by Prince Edward MG at Macaulay Heritage Park Museum. $25.00 Lunch included. Contact: 613-476-1473

June 24 – 10:00 a.m. – 4:00 p.m. 'Gardens On Parade' features 7 gardens. Tickets $8.00 in advance $10.00 on the day of garden tour. Contact: Vae Hammett vae_gilda@yahoo.ca or 519-759-1939

June 24 – 10:00 a.m. – 4:00 p.m. – Northumberland in Bloom – The Big Sisters Big Brothers Heart of Northumberland Garden Tour. Contact 905-885-6422, Toll-free 1-888-278-2484 or heartofnorthumberland@live.com

July 14 and 15 – The 5th Annual M.G.O.I. Summer Workshop will be held at the Niagara Parks Botanical Gardens and School of Horticulture.

October 13 – The 6th annual Coordinators' Conference will be held at the Landscape Ontario facility in Milton.

September 17- 21 –Fall in the Gardens and Estates of the Hudson River Valley presented by the Northumberland Master Gardeners. Includes return coach transportation, shared accommodation with hot buffet breakfast, all garden entrance fees. $675.00 Canadian (Single Supplement add $350.00) For more information contact Helen Lackey 905 377 9803 or helen.lackey@gmail.com

October 20 – Technical Update at the Simcoe County Museum in Midhurst, details to follow.

Milestones

New MGiTs
Durham – Kimberly Pacholko, Tracey Smyth

Guelph and Wellington County – Matthew Manassis, Louise Milton

London Middlesex – Linda Armstrong, Curtis Peterson, Sarah Ragalyi, Hilary Thomas

Niagara – Deborah Garofalo, Linda Crago, Gillian Craig, Ruth Moffatt, and Kit Thompson

Norfolk County – Kevin Kavanagh

Northumberland – Barbara Jones, Marg Tolland

Ottawa-Carleton – Vicki Williams

Simcoe County – Tracy Bosley, Ada Malmstrom, Debrah Rabbitts, Anna Sauve, Marie-Laure Varcoe, Catherine Waffle

Sudbury – Wendy Gauthier, Dave Kechnie

Toronto – Linda Attridge, Anne Avery, Diana Bavington, Joan Bostock, Petra Donnelly, Felicity Fowke, Wendy Halse, Adrienne Hanbidge, Mary LeQuoc, Lorraine Manoim, Patty McKnight, Caroline McRobie, Brigette Richter, Jacquie Tilford, Leah Uchida, Paula Wolfson

Quinte Tweed – Deanna Groves, Karina Lapierre-Douglas, John Riedl

New MGs
Durham – Mary Beerman, Jessica Greer, Joan Kerr, Isia Yeo

Etobicoke – Ray Bielaskie, Margaret Campbell, Mary Ellen Mathison, Ariela Weisfeld

Grey County – Karen Young

Guelph and Wellington County – Julia Kron, Katherine Granger

Haliburton – Heather Chambers, Sue Flinders-Adams, Janice Hardy.

London Middlesex – Catherine Bruce, Sandra Elfman, Lenka Whitehead, Cindy Wilson.

Peterborough – Joan Harding, Cathy Hooper, Etela Vojnic

Simcoe County – Louise Jackson, Greg Kalcic

Toronto – Joanna Blanchard, Sheila Boudreau, Jackie Campbell, Tina Cesaroni, Connie Foster, Verna Leader, Linda Lynott, Cathy McCartney, Gwen Rattle, Emma Rooney, Sheila Smith, Elizabeth A Stewart, Billy To, Maureen Webber, Joan Weed, Bonnie West, Dianne White

5 Years
Simcoe County – Rhona Desroches, Tom McCavour, Kevin Van Andel, Charlotte Vorstermans

Lanark welcomes new MG Gerda Franssen and celebrates Ankaret Dean's 15 years and Judy Wall's 10 years.

Toronto – Janet Ahier, Pat Cappelli, Yvonne Causer, Anne Chetwynd, Joe Delarge, Connie Hunter, Allesandra Leopardi, Rena Narraine, Ursula Nocon, Toni Vella

10 Years
Etobicoke – Edel Schmidt

Grey County – Sue Connelly

Lanark – Judy Wall

London Middlesex – Ron Rossini

Niagara – Iain Hay, Barb. Large, James Lee, Sue Lusted

Simcoe County – Marilyn Nielsen

Toronto – Janet Ballantyne, Nicole Leaper, Alan Millikin, Karen Silvera, Irene Hume

15 Years
Grey County – Verna Beckenhauer, Diane Everest, Ursula Karalus, Diana Lenk, Margaret McDonald, Paul Statia

Lanark – Ankaret Dean

Stratford – Janice Maciver

Sudbury – Joanne MacLellan

Toronto – Dan Cooper, Ida Harding, Jolanta Hickey

20 Years

Niagara – Marilyn Shepherd

Simcoe County – Ivy Gross

Toronto – Joan Beattie, Margaret Nevett

25 Years
Sudbury – Tina Hansen, Enzo Floreani

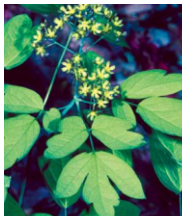
Emeritus
LSS – Valerie Liney

Simcoe County – Carol Dunk, Kevin Healey, Marilyn Nielsen,

Retired
Northumberland – Rosalee Yeo

Welcome:
Niagara welcomes Jennifer Qusen who transferred from Lake Simcoe South.

Stratford welcomes Gord Piggott and Rose Roi who were members of the disbanded Oxford group.



Mystery Plant

Do you know this plant? The answer will be revealed next issue. Contact editors@mgoi.ca with your guess.

A number of you identified last issue's mystery as *Amaranthus palmeri* (Pigweed). It is one of the many weeds that we ignore, but are very nutritious. Here are the winners Mary Ann Van Berlo, Ottawa; Janet Trezise, LSSMG; Mary Ann Gilhuly, Waterloo-Kitchener; Amy Urquhart, Durham; Louise Jackson, Simcoe County; Pat Cappelli, Toronto. If we had t-shirts you would get one.

MGs in Action

Volunteer Service Awards from the Province of Ontario:

Etobicoke - Krystyna Angel, Sandra Niemy and Cynthia O'Grady for 5 years and Barbara Promfret for 10 years.

Elgin County - Agnes Burroughs for 5 years and Bob Fox, Gail Jacques, Helen Smith, Brenda and Diane Vaughan for 15 years

Soil, it all starts here.

Diane Marchese, Guelph and Wellington County

'All through the long winter; I dream of my garden. On the first day of spring, I dig my fingers deep into the soft earth. I can feel its energy and my spirits soar.' Helen Hayes

Our sense of smell is viscerally connected to our ability to remember. As a young girl I would lie on the grass and relax in its aroma. I would walk through my parents' small vegetable garden and I can still recall the fresh scent of green tomatoes. But most of all I remember the earth after a rainfall, full of delicate and hardy undertones.

One of the reasons I became a Master Gardener was to learn why some plants flourish while others fail. I wanted to know what caused a beautiful garden. I wondered about how to grow a vigorous plant from seed and how a weak plant can be nurtured back to health.

Garden soil is the foundation of our gardens. This simple substance we take for granted is the most valuable asset of a plant's environment. It anchors its roots and derives from it nutrients, water and oxygen. Soil is made of a mixture of inorganic material from the erosion of rock and organic matter (humus) from the decomposition of plants and animals. It takes 10,000 years for rock to weather down, through the physical and chemical erosion that breaks down into soil. Then rain percolates on the soil bringing down the deposits to start developing layers called horizons. Soil is the soul of the garden.

When someone complains about the health of a plant, the first question that comes to my mind is "What's the health of the soil"? Has the garden received regular doses of compost (organic matter), which develops a strong nutrient base for plants to grow? Get your clients to think 'Feed the soil and the soil will feed the plant'

Some good references on developing a healthy soil can be found in Marjorie Harris' book How to make a Garden: The Seven Essential Steps for the Canadian Gardener. Some municipalities have a Healthy Landscapes Programs. The City of Guelph has published a 'Guide to Gardening Naturally'. It's a beautifully organized booklet with photographs and easy to follow procedures. The internet also provides many links such as http://soilfoodweb.ca that give links to a more in-depth look at all parts of the soil and its composition factors.

Understanding the soil – its texture, smell, pH and its fertility – allows for many plant problems to be eliminated immediately. The basic formula for a magnificent soil is a simple one according to Marjorie Harris: give it some TLC, feed it with compost, protect it with mulch, and then leave it alone. Mother Nature will thank you as you plant and harvest your flowers and vegetables.

Moisture Movement in Soil

Isabel Belanger, Etobicoke

Moisture movement through soil is important for plant growth, providing irrigation and moving nutrients to the plant, mainly through the plant's roots. Water acts as a solvent that dissolves soil nutrients. This enables the plant to use the nutrients and contributes to the process of photosynthesis as water transports nutrients to the upper reaches of the plant (e.g. leaves). However, during photosynthesis, water is also lost, or transpired from, the plant. The need for moisture is continuous (although it varies from plant to plant).

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Soil Moisture continued from page 6

Not all the water moving through the soil is available for plant use because of forces holding water in the soil. Water enters or infiltrates the soil, initially downwards because of the gravitational pull, and then percolates throughout the soil sideways because of capillary forces. Cohesion is the attraction of water molecules to each other; adhesion is the attraction of mineral particles and water molecules to each other. These forces mean that soil solids are able to retain moisture. They also control water movement in the soil which, to a large extent, is dependent on the type of soil – soil texture such as sand or clay – and the structure of the soil, i.e. the amount of organic matter a soil has. It takes much longer for moisture to move through a finely textured clay soil with small pores and fine particles than it does to move through a sandy soil with large pores and coarse particles. In the event of a lot of rain, the clay soil may become saturated and surface pooling or run-off may happen. Conversely, water may infiltrate a sandy soil at such a quick rate that plants cannot use the water. Also, the soil will dry out faster than a fine textured clay soil.

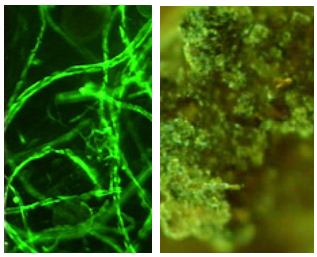
Soil structure plays an even greater role in how water infiltrates and percolates through the soil. Good soil structure with plenty of organic matter will encourage a more even distribution of moisture throughout the soil, slowing it down in sandy soils and enabling better infiltration and percolation in clay soils. Soil porosity will be improved with organic matter – sandy soils will retain more moisture, and moisture will move more easily through clay soils. Field Capacity, the stage where cohesive and adhesive forces hold water but where larger soil pores are filled with air, is the optimal stage for water uptake by the plant. Organic matter increases the soil's ability to store water that the plant can use.

The Rhizosphere's Alive

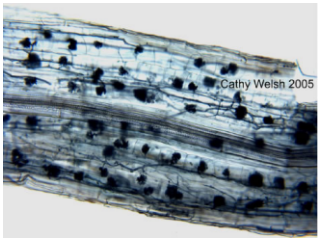
Gary Westlake, Peterborough

There is a special area right next to plant roots that we do not often think about perhaps because it is beneath us. This area, called the rhizosphere, forms a thin layer around the growing roots and it is very important to the life of plants. This zone contains many bacteria that feed on the cells the plant sloughs off as it grows. It also harbours many protozoa and nematodes feeding on the bacteria.

The rhizosphere is where a lot of the action happens for plants. It is a complex system for exchange of nutrients, gases and water. Plant roots secrete chemicals that attract mycorrhizal fungi by stimulating germination of their spores, encouraging them to grow into or encapsulate the root. This relationship between plants and fungi is critical because it extends the reach of the roots and it brings in nutrients that the plants cannot extract themselves. The glomalin left from dead fungal filaments is largely responsible for tilth because it sticks particles together.



Stained Mycorrhizal fungal filaments (left) and glomalin holding particles together(right)



Mycorrhizal fungi growing into a root

The roots of leguminous plants secrete an unknown substance that causes nitrogen-fixing bacteria to form nodules.

Some plants secrete allelochemicals that interfere with neighbouring plants.

It's a jungle down there and we only understand little bits of it so far.

Summer Workshop

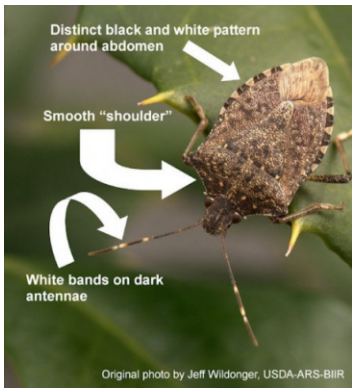
The 5th Summer Workshop will be held July 14 – 15, at the Niagara Parks Botanical Gardens and School of Horticulture. This year there will be three topics instead of two. Because there will be three instructors, the number of people attending will not be limited to 40, as in the past, this time 60 attendees can be accommodated. The cost is $250.00 for the whole weekend, the same as for the last four years. Participants will be able to choose two of the three topics being offered: An Investigative Tour of Insects and Diseases that Affect Coniferous and Deciduous Trees; An Investigative Tour of Insects and Diseases that Affect Selected Shrubs, Perennials, Annuals and Turf; The Urban Farmer – Growing Fruit and Vegetables Close to Home. Further information on these three sessions is now available on the website. Go to www.mgoi.ca and you will find the Program Outline on the home page. For additional details, or to receive registration information, please contact June Streadwick at streadwick@sympatico.ca or by telephone at 905-934-6137.

Canada Blooms

editors

Congratulations to Tena VanAndel and her hard working team for another very successful event.

Brown Marmorated Stink Bug



OMAFRA has contacted MGOI for the second year regarding the Brown Marmorated Stink Bug (BMSB), a new invasive insect that is being monitored because of its potential to cause significant damage to commercial crops in Ontario. Most new pests are noticed by home gardeners before they become apparent to commercial growers; so OMAFRA is requesting the assistance of Master Gardeners to utilize our network with the public in positive identification.

Master Gardeners should become familiar with the BMSB, and possible sightings should be reported to either Ron Rossini (rrossini@bell.net) or Lynne Marie Sullivan (zone6@mgoi.com) who have volunteered as the designated contacts with OMAFRA, since they are not adequately staffed to handle inquiries from residential gardeners.

MGs should ask home gardeners to take the following action:

- Capture one or more specimens in a jar, and take a close up digital photo if possible
- Record the date, location, and plants that are affected. BMSB will also invade homes, and has been confirmed in Hamilton. (Its range may be extended by ship, truck or migration.)
- Contact the local Master Gardeners to help make a positive identification. (There are many look-alike pests as well as 5 nymphal instars.)
- MGs should in turn contact Ron or Lynne Marie with these details.

For photos, updates and fact sheets, MGs should refer to: http://www.omafra.gov.on.ca/english/crops/insects/bmsb-resources.html

Book Review from page 2

The principles of sustainable soil management have been known for thousands of years. Yet destructive practices persist – supported, subsidized and tolerated by human expediency. The folly of unsustainable agricultural practices regularly repeats itself regardless of political regime or geography. North American soil is still lost at a greater rate than it can be replaced. Wide expanses of formerly rich farming grazing lands have become seriously depleted.

Montgomery does cite many examples of successful long-term soil conservation but they are in the minority. Peru still has terraces holding fertile soil after thousands of years of cultivation. Holland successfully maintains fertility within a confined environment. Cuba, faced with a long embargo, was forced into sustainable agriculture in order to survive. There are others.

Once we exhaust Earth there is likely no where else to go. If there is, only a chosen few will escape. Better we examine misplaced priorities and faulty definitions of progress. Soil is a thin, vulnerable skin on Earth's surface, as is behaviour that we call civilized. This behaviour is at risk when food supplies dwindle.

Master Gardeners have much to share in presentations, clinics, and articles. We should not hesitate to foster better understanding of the macro and micro importance of maintaining soil fertility with restorative organic input and other best practices. This is a good time to encourage clients to grow their own food and support local growers and sustainable agriculture and horticulture in general. We will do well teaching sustainable soil management practices – whether in patio pot or field, flower bed or vegetable plot.

Montgomery does much to enrich our understanding of what is mostly an invisible process, too easily explained away by interests that deny what is really happening, or those who believe in the eternal availability of technological fixes. Our work as Master Gardeners is extremely important. Montgomery's book can be an inspiration to us all.

Note: David R. Montgomery is Professor of Earth and Space Science at the University of Washington.

See also "Short History of Progress" Ronald Wright