

## Master Gardener Volunteer Core Competencies for Classwork and Self Study

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These competencies are presented by the subject areas typically covered in the basic Master Gardener Volunteer (MGV) training and/or in readings within the manual. **The competencies can be used by coordinators as they design their respective training for MGV candidates, by instructors to make sure their lesson covers the topics listed and by the MGV candidate to view, at a glance, all that they will or have learned.**

Each subject area includes a list of items about which the student has gained knowledge. The subject areas also highlight practical skills that will help students become more confident in assuming their roles to assist clients. These skills offer a set of tangible, specific services that MGVs can use immediately in service to their community.

### BEING AN EFFECTIVE MASTER GARDENER VOLUNTEER

At the end of this session you will be able to articulate and explain:

- The mission, program breadth and funding sources of the University of Maine Cooperative Extension
- How and where the Master Gardener Volunteers program originated
- Maine Master Gardener Volunteers Program policies
- The “hows” and “whys” of reporting volunteer hours and activities
- The process and requirements of annual re-enrollment
- Tips for effective communication with fellow volunteers, clients, and Extension office staff
- How to minimize risk when working with youth, elderly and other vulnerable populations (VOLT training principles)
- Potential Master Gardener Volunteer projects in your area

Practical skills gained and strengthened:

- Be able to identify relevant technical and administrative resources that support you in service to your community. These resources include faculty, office staff, labs, UMaine and nationwide Extension websites aka .edu sites, etc.
- Be able to better network and reach out to all community members

### SOILS AND FERTILIZERS

At the end of this session you will be able to articulate and explain:

- The composition of soil

- The difference between soil texture and soil structure (effects of excessive tillage), the advantages and disadvantages of each soil texture (clay, silt, sand), the importance of organic matter in the soil.
- Soil fertility and pH
- The role and importance of soil pH
  - The pH scale (acidic to basic, logarithmic)
  - How pH adjustments are made in the soil
  - Cation Exchange Capacity (CEC) and its relation to fertility
- Essential macronutrients and micronutrients needed for plant growth
- Soil testing and interpretation
  - Don't Guess, Soil Test! - The importance of soil testing.
  - How to sample soil and complete the soil testing form properly
  - How to interpret a soil test and its recommendations
- How to compare fertilizers
  - Types of fertilizers and their relative attributes (synthetic & organic)
  - How to interpret a fertilizer label
  - How to select the appropriate fertilizer for a specific use
  - How to select a substitute fertilizer, when the fertilizer recommended in your soil test results is not available at the store
  - How and when to apply fertilizers to minimize environmental impact
- Home composting
  - Key factors in effective composting (microorganisms, organic materials (C:N ratio, particle size, air, moisture, and pile volume)
  - How to troubleshoot and correct home composting problems
  - The characteristics of and uses of finished compost
- Cover cropping and organic soil amendments
  - Reasons to use cover crops
  - Appropriate cover crop for each reason
  - Cover crops and when they are planted in Maine
  - Organic amendments and how they affect soil

Practical skills gained and strengthened:

- How to sample soil and complete the soil testing form properly
- How to interpret a soil test and its recommendations
- How to interpret a fertilizer label
- How to select the appropriate fertilizer for a specific use
- How to select a substitute fertilizer
- How and when to apply fertilizers to minimize environmental impact
- How to troubleshoot and correct home composting problems

## **BOTANY**

At the end of this session you will be able to articulate and explain:

- The binomial system (*Genus species*) of plant nomenclature
- Meaning of the terms hybrid, open-pollinated, variety and cultivar

- Plant parts (roots, stems, buds, leaves, flowers and fruits) and their functions
- Be aware of how a plant is identified - ie. using a dichotomous key
- Plant growth, development and differentiation
- The processes of photosynthesis, respiration and transpiration in plants
- Major environmental factors that influence plant growth, development and phenology (spacing, nutrients, light, day length, water, temperature)

Practical skills gained and strengthened:

- How to identify a plant using various tools - dichotomous key, on-line search, reference books
- How to provide the proper environmental conditions for optimal plant growth and production.

## **PLANT PROPAGATION**

At the end of this session you will be able to articulate and explain:

- The basic techniques and reasons for vegetative (asexual) propagation of plants including division, layering, cuttings and grafting
- The basic techniques and reasons for seedage (sexual) propagation of plants
- The parts of a seed and the environmental factors necessary for germination and growing on
- Potential seedling diseases
- An understanding of the role that containers, growing medium and fertilization play in plant propagation
- The processes of hardening off and transplanting seedlings
- The basics of seed saving and storage

Practical skills gained and strengthened:

- How to successfully perform (and grow on) at least one vegetative propagation technique.
- How to successfully perform proper seeding technique
- How to harden off transplant seedlings

## **PLANT PATHOLOGY**

At the end of this session you will be able to articulate and explain:

- The difference between biotic and abiotic diseases
- The three main types of biotic diseases (fungal, bacterial, viral)
- The factors necessary for plant disease to occur (the “disease triangle” and/or “disease pyramid”)
- How to use the ‘IPM Triangle’ to identify preventative measures and controls for plant diseases
- The importance of properly identifying the disease, assessing severity of damage and noting time of year before considering control

- The signs and symptoms of at least one common disease of ornamentals, vegetables and fruits; (powdery mildew, downy mildew, Pythium root rot, rust, apple scab and others)
- How to package samples for shipment to the Pest Management Lab for diagnosis; and articulate and explain what information is needed for plant disease diagnostics
- Why Master Gardener Volunteers do not offer advice on the use of pesticides

Practical skills gained and strengthened:

- How to prevent and control plant diseases (IPM Triangle)
- Be able to locate disease resistant varieties in a seed catalog
- Identify common plant diseases found in Maine gardens and landscapes
- How to collect and package samples for shipment to the Pest Management Lab for diagnosis
- How to gather the necessary information for plant disease diagnostics

## **ENTOMOLOGY**

At the end of this session you will be able to articulate and explain:

- Key morphological characteristics of insects;
  - Three major body parts: head, thorax, abdomen
  - Six legs
  - Exoskeleton
  - Antennae
- The two common life cycle types of insects - gradual and complete metamorphosis
- The characteristics of five orders of common garden insects:
  - Coleoptera (beetles)
  - Diptera (true flies)
  - Lepidoptera (butterflies and moths)
  - Hymenoptera (bees, wasps and ants)
  - Hemiptera (true bugs, hoppers, aphids)
- The fundamental components of Integrated Pest Management (IPM);
  - Knowledge of crop, Knowledge of pest, Monitoring, Thresholds, Action steps (actual management methods) and Evaluation
- How to use the 'IPM Triangle' to identify preventative measures and controls for plant pests
- Common arthropod pests of fruit and vegetable crops and ornamentals/turf;
  - Fruit crops: e.g. tarnished plant bug, strawberry weevil, blueberry maggot, raspberry cane borer, apple maggot
  - Vegetable crops: e.g. striped cucumber beetle, asparagus beetle, squash bug, cutworms, hornworm,
  - Colorado potato beetle, imported cabbage worm
  - Ornamentals/turf: e.g. Japanese beetle, lily leaf beetle, viburnum leaf beetle, mites, eastern tent caterpillar
- Beneficial organisms (predatory or parasitic) and how to attract them to the garden;
  - Examples: braconid wasps, ichneumonid wasps, nematodes, lady beetles, spiders, green lacewings

- The threat that invasive insect species pose in Maine
- Why Master Gardener Volunteers do not give advice on the use of pesticides

Practical skills gained and strengthened:

- How to prevent and control pests (IPM Triangle)
- Become familiar with the latest sources for cultural/mechanical pest control techniques geared to a specific pest
- Identify common pest species found in Maine gardens and landscapes
- Identify common beneficial organisms found in Maine landscapes

## **PESTS and PESTICIDE SAFETY**

At the end of this session you will be able to articulate and explain:

- The different types of pesticides and how they work;
  - Insecticides, fungicides, herbicides, rodenticides, etc.
- The terms “natural”, “organic”, “biological”, “synthetic” do not imply how safe or toxic a product is.
- The different pesticide formulations, and which formulations pose the least risk of exposure to the user;
  - Ready to use (RTU) solutions, granules, baits,
  - Emulsifiable concentrates,
  - Wettable powders, aerosols, dusts, etc.
- How to read, understand and follow a pesticide label;
  - Active ingredient,
  - Level of toxicity (LD50, signal word),
  - Type of PPE to use
  - How to mix and apply
  - Site and pest on which it can be used,
  - Reentry interval / days to harvest,
  - Environmental hazards, emergency procedures, etc.
  - LABEL IS THE LAW
  - Application is restricted to only crops listed on label
- How to assess the risks vs. the benefits of pesticide use;
  - Potential risks: non-target species affected, off-site exposure, accumulation in the environment, reduction in natural predators, etc.
  - Potential benefits: better yield, reduced natural toxins in crops, less crop damage, aesthetic, public health improvements, etc.
- Principles of Integrated Pest Management (IPM);
  - Identify the problem - Is the problem caused by a pest?
  - Assess the level of damage
  - Determine if a control is needed (threshold)
  - Apply a control: use least toxic option first, correct timing / susceptible stage of pest, apply only where needed, etc.
  - Monitor and assess the result: keep records of pest damage, controls used and results

- How to reduce pesticide exposure to the environment;
  - Alternative pest management strategies: cultural controls, mechanical controls, biological controls, tolerance for damage, etc.
  - Spot treatments instead of broadcast treatments
  - Principles of resistance and resistance management
  - Reduce pesticide drift: timing, weather
  - Protect water bodies (25 foot buffer zone required for all broadcast applications)
  - Keep products off impervious surfaces, don't apply just before rain.
- How to minimize pesticide exposure to humans;
  - Identify individual sensitivities
  - Selection and use of proper personal protective equipment (PPE)
  - Keep in original containers
  - Follow proper mixing and application procedures
  - Understand dose: exposure & toxicity
- How to properly store, secure and dispose of pesticides.
  - Keep in a location away from children
  - Purchase the smallest quantity for your needs
  - Understand the storage needs of different formulations of pesticide: (powder, liquid, EC, etc.)
- Become familiar with Maine Board of Pesticides Control (BPC)
  - Questions
  - Complaints
  - Pesticide Pick-Ups for old, out of date, expired
- Why Master Gardener Volunteers do not give advice on the use of pesticides

Practical skills gained and strengthened:

- How to read, understand and follow a pesticide label;
- Acquire and keep dedicated PPE on hand to use when needed. Know how to launder and re-use, if applicable.
- How to access credible information on pesticides.

## **FOOD SECURITY**

At the end of this session you will be able to articulate and explain:

- The latest statistics and impacts of food insecurity in Maine
- The challenges of providing fresh produce to hungry residents via food pantries -
  - Clients may not want it
  - Little or no refrigeration
  - Infrequently open-some pantries only open once a month
  - Limited space or facilities
  - Expanding need for nutrition education and cooking demos that outstrips current staffing
- How to become more involved in the Maine Harvest for Hunger Program or another local food security program

Practical skills gained and strengthened:

- How to become more involved in the Maine Harvest for Hunger Program or another local food security program

## **FOOD SYSTEMS**

At the end of these sessions you will be able to articulate and explain:

- The components of a food system and each person's role in it as a consumer and perhaps also as producer, processor and/or distributor
- How the University of Maine Cooperative Extension supports and is part of the Maine Food System
- The current statistics regarding food waste and steps that can be taken individually and state-wide to minimize the food waste stream

Practical skills gained and strengthened:

- Actively involve yourself in the food system - ie. supporting local farms, minimizing waste, becoming an informed consumer

## **GROWING VEGETABLES AND HERBS**

At the end of these sessions you will be able to articulate and explain:

- Factors to consider when selecting a garden site
- Factors to consider when planning a vegetable garden
  - Variety selection to match conditions
  - Comparison of raised beds, in ground beds and conventional rows
  - Reasons for crop rotation and how to develop a simple rotation plan
  - Concepts and practices for intensive vegetable production
  - Basic garden record keeping
- Key aspects of vegetable garden maintenance
  - Watering
  - Weed management
  - Fertilization
- Techniques for extending the garden season
- How and when to harvest and properly store common vegetable crops
- Food safety and Good Agricultural Practices (GAP) for a safe harvest

Practical skills gained and strengthened:

- Identify, prevent, and manage common weeds
- How to plan, plant, and maintain a vegetable and/or herb garden
- How to implement succession planting
- How and when to harvest and properly store common vegetable crops

- Food safety practices used in preparing fresh foods for consumption

## **GROWING SMALL FRUITS**

At the end of these sessions you will be able to articulate and explain:

- The critical components of a suitable site for growing small fruits
- Fundamentals of growing strawberries; proper planting, early care, winter production and renovation strawberry beds; characteristics of recommended varieties
- Fundamentals of growing raspberries and blackberries; proper planting, early care, trellising and pruning of brambles; characteristics of recommended varieties
- Fundamentals of growing highbush blueberries; special soil needs, proper planting, early care and pruning; characteristics of recommended varieties
- Types of pruning cuts (heading and thinning) and how plants respond
- Why currants and gooseberries (*Ribes* family) are illegal to import and grow in parts of Maine

Practical skills gained and strengthened:

- How to select and prepare a proper site for specific small fruit species
- How and when to renovate a strawberry bed
- How to trellis and prune brambles
- How and when to prune highbush blueberries
- Selecting, using and caring for appropriate tools for pruning small fruit

## **WILDLIFE**

At the end of this session you will be able to articulate and explain:

- Common problems caused by wildlife in the garden and landscape and first line of defense measures.
  - <http://www.maine.gov/ifw/wildlife/human/living.html>
  - <http://npic.orst.edu/pest/wildyard.html>
- The University of Maine Cooperative Extension no longer responds to wildlife damage control calls. The USDA Wildlife Service should address all wildlife calls and situations.
  - <http://www.maine.gov/ifw/wildlife/pdfs/ad09112016.pdf>

Practical skills gained and strengthened:

- Identifying local resources to assist clients with wildlife issues in the home garden and landscape

## **GROWING FRUIT TREES**

At the end of this training, you will be able to articulate and explain:

- The critical components of a suitable site for growing fruit trees in the home landscape

- The different species of fruit trees commonly grown in Maine and a major weakness for each
- The selection process for appropriate varieties of fruit trees
- Why and when fruit trees are commonly grafted
- The difference between dwarf, semi-dwarf and standard sized fruit trees
- Reasons why rootstocks are used in tree fruit production
- Basic principles and purposes for pruning different kinds of fruit trees
  - Types of pruning cuts (heading and thinning) and how plants respond
- Disease, insect and wildlife prevention and control methods
  - <http://extension.psu.edu/plants/gardening/fphg/wildlife-damage>

Practical skills gained and strengthened:

- How to select appropriate rootstocks and varieties of fruit trees for specific locations and growing conditions
- How to plant, prune, and care for fruit trees
- Selecting, using, and caring for appropriate tools for pruning fruit trees
- Identify resources to help with wildlife control in orchards

## **SELECTION AND CARE OF HERBACEOUS LANDSCAPE PLANTS**

If this section is addressed in training, you will be able to articulate and explain:

- The life cycles of flowering annuals, biennials and perennials
- The criteria for appropriate herbaceous plant selection for aesthetic or utilitarian purposes:
  - For different site conditions (sun, shade, wet, dry, etc)
  - To address landscape conditions or problems (screening, wet swale, heavy traffic etc.)
- Explain the most common ways in which herbaceous plants are propagated
- Group plants with similar needs (water, fertilizer, sun) for easier maintenance
- General flower garden care during the season.
  - Site selection
  - Soil preparation
  - Transplanting
  - Managing weeds
  - Fertilizing
  - Effective irrigation
- Give examples of plants and plant combinations that are suitable for Maine gardens and relatively new in the trade.

Practical skills gained and strengthened:

- **RIGHT PLANT, RIGHT PLACE:** Give examples of plants and plant combinations that are suitable for Maine gardens
- How to select healthy plants from a retailer

## **SELECTION AND CARE OF WOODY LANDSCAPE PLANTS**

If this section is addressed in training, you will be able to articulate and explain:

- The three forms in which trees and shrubs can be purchased and the advantage disadvantages of each form
  - Balled and burlapped (B&B)
  - Containerized
  - Bare-root
- The basic steps and considerations for planting a tree or shrub
  - Selecting the proper tree for the site
  - Timing
  - Hole size (depth and width)
  - Pros and cons of amending backfill
  - Watering
  - Staking
  - Mulching
- How and when to properly transplant different landscape trees
  - Timing
  - Root pruning
- The basics of landscape tree or shrub care
  - Establishment period and water needs
  - Fertilization
  - Pruning
- The basics of pruning landscape trees and shrubs
  - Reasons for pruning (safety, plant health, control size, direct growth, promote flowering or fruiting)
  - Necessary tools, tool care and safety (pole pruners, loppers, pruning saws and hand shears)
  - Appropriate timing (time of year, age of plant)
  - Types of pruning cuts (heading and thinning) and how plants respond
- Non-native, invasive woody plants in Maine and why they are a problem in managed landscapes. (Norway Maple, winged euonymus, oriental bittersweet, Japanese barberry, shrubby honeysuckle, etc.)
- Familiarity with some of the typical native trees and shrubs appropriate for different landscape conditions. Group plants with similar needs (water, fertilizer, sun) for easier maintenance.
  - Sunny, well drained landscape
  - Shady, woodland landscape
  - Seasonally flooded landscape
  - Coastal, lakeside or alpine landscape (Choose what is most appropriate for your region of the state)

Practical skills gained and strengthened:

- How to plant and care for woody landscape plants
- Proper use of different pruning cuts (heading and thinning), taking into account how the plants will respond
- Be able to recommend typical native trees and shrubs appropriate for these different landscape conditions -
  - Sunny, well drained landscape
  - Shady, woodland landscape
  - Seasonally flooded landscape
  - Coastal, lakeside or alpine landscape

## **SUSTAINABLE LAWNS AND GROUNDCOVERS**

If this section is addressed in training, you will be able to articulate and explain:

- Sustainable lawn establishment practices
  - The advantages and disadvantages of using seed or sod
  - Proper site preparation
  - Selection of appropriate grass varieties
  - How and when to seed a lawn
- Low-input lawn maintenance
  - De-thatching
  - Aeration procedure and timing
  - Proper mowing techniques
  - Water and fertilizing
  - Over-seeding
  - Managing weed, insects and diseases
  - Common seasonal practices in Maine
- Alternatives to Turf
  - Advantages and disadvantages of reducing turf-grass
  - Methods for removing turf
  - Alternatives to turf with a focus on groundcovers and native species

Practical skills gained and strengthened:

- How to select appropriate grass varieties for a Maine lawn
- How to effectively maintain a healthy lawn through proper mowing, fertilization and watering

## **SUSTAINABLE LANDSCAPE DESIGN**

If this section is addressed in training, you will be able to articulate and explain:

- The elements of the art of landscape design
  - Color, texture, form, line, space, pattern, and light
- Basic steps of landscape design based on biology, site analysis, engineering and project management

- Assess the site in relation to the goals of the project
  - Define the environment both above and below the ground
  - Consider the function of the space-function before form
  - Make a list of the things you would like to include in the final plan
- Develop a theme/themes for the landscape for filtering decisions
  - Design for beauty using the elements of art in the landscape
  - Determine which functions would be best served by hardscape and which by plants
  - Design the structure and layout of the landscape
- Assess the factors influencing the design
  - Assess what is good in the existing landscape and what needs to be eliminated
  - Develop a budget (labor and materials) for the entire project and sub-projects
  - Consider labor and financial costs of long-term maintenance
  - Create an installation timeline where hardscape precedes planting
- Installation: Select plants and use proper planting practices
- Filter plant choices by theme
- Choose plants by function and suitability to site
- Consider hardiness, size, color, texture, and seasonality
- Develop effective, scaled, sustainable plant combinations
- Follow good planting and establishment practices
- Applying landscape design principles to projects
  - Balance/Style
  - Dominance, focal point, focalization
  - Scale and proportion
  - Rhythm and repetition
  - Transition/Tension
  - Contrast
  - Unity
  - Simplicity
- Evolution of landscape design in reaction to environmental stewardship
  - Sustainability
  - Appropriate use of native and non-invasive exotic plants
  - Water quality and conservation
  - Energy conservation
  - Developing sustainable landscapes that have long term, low carbon footprint.
  - Awareness of what practices will help meet the goals of the space and sustainability

Practical skills gained and strengthened:

- Be able to assess a landscape design - highlighting strengths and offering areas for improvement
- Be able to draw a bubble diagram of a home landscape design.