Effectively controlling pests is both more complicated than most people think AND more important. Thankfully, we have many tools and a wide variety of boundaries. This was one of the primary motivators of the formation of Virginia’s first Cooperative Weed Management Area, the Blue Ridge PRIM (Partnership for Regional Invasion Species Management). The PRIM, among other things, aims to create community-wide action to cooperatively knock out invasive plant species populations across property lines.

The use of herbicides is an effective way to control many pests. But you should be aware that some herbicides can also harm beneficial plants. Therefore, it’s important to understand what you are using and how to use it correctly, as this can have a major impact on the environment and the effectiveness of your control measure.

Biological control is another approach. An exciting development in this realm is happening right here in Virginia. Virginia Tech is working with specialists from the USDA and the Forest Service to develop new and effective biological control agents for invasive plant species. This approach can be particularly useful for managing invasive plants that are difficult to control using other methods.

One of the most important aspects of Integrated Pest Management (IPM) is the use of herbicides. When using herbicides, it’s important to follow the label carefully and understand the risks and benefits of each product. It’s also important to consider the environmental impact of herbicide use and to use products that are environmentally friendly.

When it comes to herbicides, it’s important to understand what’s on the label and what it means. The label is the law and it must be followed. Herbicides can be classified into different categories, such as pre-emergent and post-emergent, depending on when they work. Pre-emergent herbicides are applied before the weed emerges, while post-emergent herbicides are applied after the weed emerges.

The most common herbicides used in forestry are bentazon, cyhalofop, and roundup. These herbicides are effective against a wide range of weed species, but they can also harm beneficial plants. Therefore, it’s important to choose the right herbicide for the job and to follow the label carefully.

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As exotic invasive species continue to spread, control and restoration costs mount. As of 2009, China alone had more than 230 invasive species, more than any other country. The International Union for Conservation of Nature’s 100 worst invasive species in the world, China 50. This is a result, in part, of large areas and numerous ecosystems lost; and in part because of the rapid rate at which our species are spread. Natural resource professionals are all too familiar with the difficulties and challenges of dealing with these species. A recent study by the US Forest Service, the Cooperative State Research, Education, and Extension Service, and the Office of Sustainable Forestry, found that invasive species cost the United States over $2 billion annually (Pimentel et al., 2005). Costs arise from decreased productivity and expenses associated with control efforts. Virginia alone has over 90 species of exotic invasive plants. Exotic invasive plants tend to be pioneer species. They quickly occupy sites that have been recently disturbed. Japanese stiltgrass is a good example of an invader that fills in on disturbed soils along hiking trails, roads, and logging roads. As parcelization and fragmentation (land use change) occur across Virginia, these disturbed areas increase.

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Exotic invasive species have negative ecological and economic impacts. Negative ecological impacts may include:

1. Altered ecosystem function. Exotic invasive change basic nutrient-ecosystem function in many ways. For example, the exotic invasive insect, the hemlock wooly adelgid, kills by feeding inside growing stems. These hemlock have historically shaded understory species, increasing shrub and vine growth. This increase in shrub coverage leads to decreased biodiversity. The heart of the forest has been damaged.
2. Reduction of native species. Because of certain characteristics described below, exotic invasive species can out-compete native species in various ways. For example, we can see the evidence in the destruction of a hemlock grove near my house. Dye often selectively chooses on our native plants, leaving the non-natives alone. This gives the exotics an additional advantage. Habitats.
3. Reduced productivity. Thinner and native woodland productivity on sites overtopped by exotic invasive species will decrease, as native species often do not compete well with exotic species.
4. Reduced biodiversity. In areas invaded with exotic species, we typically see a significant diversity loss as natives are pushed out.

Economically invasive exotic costs the United States over $2 billion annually (Pimentel et al., 2005). Costs arise from decreased productivity and expenses associated with control efforts. Virginia alone has over 90 species of exotic invasive plants. Invasive:

Avoid known traits. Because of certain characteristics described below, exotic invasive species can out-compete native species in various ways. For example, the exotic invasive insect, the hemlock wooly adelgid, kills by feeding inside growing stems. These hemlock have historically shaded understory species, increasing shrub and vine growth. This increase in shrub coverage leads to decreased biodiversity. The heart of the forest has been damaged.
1. They have no natural predators in their new environment. Most species that are invasive in their introduced location are not eaten or controlled by their native range. Invasive exotic species come in all shapes, sizes, and life histories. There are exotic invasive mammals, fish, insects, crustaceans, mollusks, fungi, bacteria, fungi, plants, and viruses. But all that really matters is the characteristics that allow them to colonize their new environment and their ability to thrive.
2. They have no natural predators in their new environment. Most species that are invasive in their introduced location are not eaten or controlled by their native range. Invasive exotic species come in all shapes, sizes, and life histories. There are exotic invasive mammals, fish, insects, crustaceans, mollusks, fungi, bacteria, fungi, plants, and viruses. But all that really matters is the characteristics that allow them to colonize their new environment and their ability to thrive.
3. They can overwhelm managed ecosystems. Invasive species are able to overwhelm ecosystems by consuming all of the available resources, thus decreasing biodiversity. They are able to adapt to different environments and therefore can be found almost anywhere. For example, the emerald ash borer is able to adapt to different environments and is found in almost any state in the United States.
4. They are excellent at spreading their progeny. A key element of being an invader is the ability to spread across the landscape. Aquatic invasive species, such as zebra mussels, is able to spread across the landscape by windblown spores and floating on seeds. Some species are able to reproduce in more than one way. For example, the emerald ash borer is able to reproduce asexually, so it can spread quickly through a population. They also produce spores that can spread to new locations.
5. The invasive species often do not compete well with native species. This gives the exotics an additional advantage. Habitats.

And what do you look for if you’re judging an ecosystem to see if it’s over run by exotic invaders? First look for any species that are spreading, reproducing, and taking over large areas. Second, look for an effective plan of attack that’s hopefully by their logic. Finally, stay positive. You are not alone in your fight against exotic invasive species. They are an international problem. In fact, in 1901, the first known shipment of exotic invasive species to the United States, the chestnut blight. This is a result, in part, of large areas and numerous ecosystems lost; and in part because of the rapid rate at which our species are spread. Natural resource professionals are all too familiar with the difficulties and challenges of dealing with these species. A recent study by the US Forest Service, the Cooperative State Research, Education, and Extension Service, and the Office of Sustainable Forestry, found that invasive species cost the United States over $2 billion annually (Pimentel et al., 2005). Costs arise from decreased productivity and expenses associated with control efforts. Virginia alone has over 90 species of exotic invasive plants. Exotic invasive plants tend to be pioneer species. They quickly occupy sites that have been recently disturbed. Japanese stiltgrass is a good example of an invader that fills in on disturbed soils along hiking trails, roads, and logging roads. As parcelization and fragmentation (land use change) occur across Virginia, these disturbed areas increase. You are not from around here! The trouble with Tribbles by Jennifer Gagnon

The tribbles are too much - even for the great Captain James T. Kirk! Image from Star Trek. The Original Series.

Prior to Star Trek, tribbles were not only a household name, they were a mascot for the US Space Program. They were used as a test for the effects of microgravity on biological organisms. The tribbles are too much - even for the great Captain James T. Kirk! Image from Star Trek. The Original Series.

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Tribble control continued on page 4.

BEF, March 26

Boyce, Appomattox

Johnnie Walker Lumberjack, Plum elt, VA. I'm certain all my readers who are hard-core Trekkies instantly appreciated my title reference. For the rest of you, let me explain. On March 8, 4011 B.C., the first tribble was born aboard the USS Enterprise. The great James T. Kirk, actress at Deep Space Station 9. It's here, at ST. Leonard's Shrub Church, that we've given a small, charming, furry little life form known as a tribble. And that's when the trouble began. You see, tribbles are an alien species that naturally occur on the Enterprise and the people in this environment quickly reach over one million. After the tribble problem is solved, the Tribbles are left to their own devices. And the more they grow, the more they reproduce. As a result, the sustainability of the crew's food supply is threatened. This just goes to show that exotic species are able to spread so quickly, in spite of careful planning.

After this conversation, you might wonder where these tribes are. Many exotic species are generalist and are able to live in a variety of different habitats. An example is the zebra mussel, which can be found in freshwater habitats. Tribble control continued on page 4.

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