

## **Section VII. - Alternative Pest Reduction Management Options:**

### **Cultural controls:**

**Mulching / Newspaper or cardboard layering:** Mulching over several layers (4 minimum) of newspapers achieved several weeks seasonal weed control, similar to pre-emergent. Mulch depth must be limited to only a few inches (2-3") to promote plant health, and receive benefits of proper soil/water & air exchange. Recommend using only once a year, such as with planting annual flowers. Some seasonal labor is currently employed to assist with this labor-intensive process. Process of layer with newspapers required 2x regular man-hours.

**Impact:** A twice-a-year method would be more effective on the fall weeds, but create more work because slowly decomposing wood chips will have to be removed. Any extra mulch depth (4-6"), could be detrimental to the landscape plants by causing anaerobic conditions in the decomposing mulch. In addition, it could create a microenvironment for insects and hold excessive amounts of moisture. In landscape areas, such as downtown, where flower displays are rotated more often, the process becomes increasingly more labor intensive and requires additional resources. Compared to conventional pesticide application for weed control, 3-4 times the time, equipment and labor involved.

**Mulching only: annual application:** 100% of all city landscape areas are mulched with or without use of newspapers, with reasonable weed control success. The main advantage of mulch is to help reduce soil temperature fluctuations and water evaporation.

**Manual hand cultivating:** This fundamental practice is used by landscape staff in all landscape areas. Much hand work is involved in caring for bedding plants, such as deadheading old flowers, watering, pruning, thinning, weeding, and other hand to hand attention to detail. This requires a trained and dedicated staff with an eye and interest for detail-oriented work. Additional seasonal labor is employed to assist with this process. Current staff shortages will make this difficult to sustain at a previous level.

**Turf Aeration:** A practice used in parks, municipal building lawns, golf course, and athletic fields to improve porosity and water movement in compacted soils near turf grass roots. Aeration requires specialized equipment and increased labor force to facilitate work. It is advantageous to the turf roots and increases success of new seed beds in both irrigated and un-irrigated areas. Staffing limitations and equipment shortages limit this practice to resources on-hand.

**Soil improvements with compost:** For new city landscape and turf projects, much of the clay soil structure has been improved by using organic matter from a city resource of turf grass/leaf compost. This is inexpensive, nutrient-rich, in good supply and available in large tonnage quantities. Works best for us to use compost over two years old to avoid damage from temperature fluctuations, must be lower than 150 degrees. Best success if incorporated as a moderate amount into the soil prior to any planting or seeding. Good source of microorganisms.

**Impact:** Overuse can lead to insect problems, or burning of plant tissue. Staff must have knowledge of product and how to use it to avoid associated problems. This strategy must rely on natural time and temperature to break down compost into useable product.

**Soil improvements with Hydro gel Products:** A synthetic acrylic polymer was used downtown (3 years) with horticultural applications, resulting in reduced water needed by about 30%. Water loss due to evaporation and drainage was reduced. The product is neutral pH and releases its stored water back to the plants. Staff is researching product for street tree or other water challenged applications.

**Impact:** Effective, but expensive and must be incorporated into the soil.

**Black Plastic on soil surface:** Plastic was used in Buford Watson Park as a trial and last resort to kill perennial weeds in non pesticide areas. Mulch was spread over top to help enhance the appearance. This will be checked one year later to see if it was successful. Generally no plants will grow in this environment.

**Landscape Fabric on soil surface:** No longer used by the city landscape staff under landscape plants due to several reasons: diversity of plants types (trees, shrubs, perennials, and annuals, in combination beds, would require cutting fabric in many locations- reducing its effectiveness; the fabric is expensive, and causes drought conditions in the soil for plantings, (impervious to water) and can girdle plants if left over a long period of time; the fabric can become unsightly and get caught in turf maintenance equipment; mulch also decomposes over the top of fabric, creating a seed bed that does not inhibit weed growth, but may be used effectively under inorganic mulch, such as rock or gravel.

**Irrigation and Surface Water Management:** This practice targets water distribution only to those plants needing water to sustain life through the photosynthetic process. Excess water can possibly lead to increased disease and weed problems in turf and landscape beds, and cause rapid decline in Oak tree species in the parks.

**Impact:** Management is highly variable, due to site conditions at various locations in the parks system, and many crews & staff members in control of watering methods. Ongoing maintenance requirements of numerous systems and proper operation will require additional resources.

**Sanitation:** Remove disease, insect or nematode infested plantings such as dead Elm, Pine, or Juniper plantings, which might lead to a public nuisance situation. Clean up, remove, or destroy the debris or other sources of problems. Eliminate planting of these species in public and private spaces in Lawrence through site plan process and ordinance update. Labor intensive process that requires additional resources.

## **Biological Controls:**

**Host plant resistance:** Use design principles to create new spaces and purchase landscape and/or turf plants that are resistant to disease and insect problems. This includes use of some native and/or adaptable plants that can thrive in certain undesirable environmental conditions. For example, staff created a successful Public Demonstration Xeriscape Garden, with the use of native materials and labels for the public to understand. This was completed using little water resources.

**Landscape Design:** Preserve and create biological diversity in park areas by planting diverse populations of plants. In regard to plant selection, staff has adopted a recommended tree list for Northeast Kansas with plant selections that are native and adapted with right place right plant goals. Staff are avoiding planting other plants that are continual nuisance problems, such as silver maples, hackberry, mulberry, hawthorns, ash, honeysuckle, Scotts pine, Austrian Pine, etc. Landscapes are designed with these principles/ concerns in mind. Other commercial and public plans are also undergoing some of the same process.

**Biological / Organic product trials:** Use Organic products that are environmentally friendly. Examples: 'Conserve' product used successfully for bagworm control, 'Armacarb' used for disease control with limited success, Horticulture Ultra Fine Oil was successfully used on scale and spider mites, and Insecticidal RTU Soap products were used with limited success on spider mites, pine sawfly, other caterpillars (poor results on bagworms). The less expensive, more applicable, insecticidal soap concentrate product was not available with a caution label, and therefore did not meet our policy. Neem oil was also used according to label with poor results for bagworm control.

**Impact:** Staff knowledge and budget restraints limit progress in this area. Short residual solution that leads to increased treatments and trips to site will increase fuel costs for city vehicles.

## **Alternative Chemical Control:** *(Experimental and Retired in 2009)\**

**Propane Flamer Machine:** Effective on hard surfaces like sidewalks, parking lots, gravel or bare soil. The Flamer heats the plant to a level where the cell content is damaged. The weed dies due to the cytoplasm injury; however, it does not affect the root system, resulting in some weed re-growth.

**Impact:** Equipment is difficult to maneuver around. The flame discolors the sidewalk where applied. Flame also left the applied area heated for up to fifteen minutes after treated. Machine can not be used around parked car tires, near curbs because of high heat factor. For future applications, staff may check into a backpack kit and 10 lb. cylinder. All units are highly flammable and volatile if mishandled. According to comments and public perception in the field, people still view this as spraying. This is a short residual solution that leads to multiple trips to the site and increased city fuel costs. Burning carbon fuel is not a sustainable environmental practice.

**Horticultural Vinegar based weed killer:** Claims to control broadleaf weeds wherever necessary, having no adverse effects on the environment, however there is no scientific data back up their usage.

**Impact:** Only had limited success when applied on dry soil on hot days, and was not effective at all on a long-term basis. Product did not kill weeds, only burned the edges. The 20% acid in this product posed a high risk to applicator for eye, skin, and respiratory problems. Vinegar sold as an herbicide carries a category "I" label. This method has no proven science behind it and is under litigation in several states for false advertising. This product was attained because of direction by the City Commission. It requires personal protective equipment to apply, the temperature must be above 65 degrees, and can easily be washed off by rain, acting as a nitrogen releasing fertilizer. Additionally this product lowers the PH of the soil when applied and can harm non target landscape plants and water resources.

**Orange Peel Extract Weed Killer:** Used to control broadleaf weeds. Only had limited success when applied on dry soil on hot days, and was not effective at all on a long-term basis. Product did not kill weeds, only burned the edges. The 20% acid in this product posed a high risk to applicator for eye, skin, and respiratory problems. This method has no proven science behind it and is under litigation in several states for false advertising. This product was attained because of direction by the City Commission. It requires personal protective equipment to apply, the temperature must be above 65 degrees, and can easily be washed off by rain, acting as a nitrogen releasing fertilizer. Additionally this product lowers the PH of the soil when applied and can harm non target landscape plants and water resources.

**Impact:** Acid in this product posed a high risk to applicator for eye, skin, and respiratory problems. This is an expensive product to purchase as well as expensive to ship. It requires personal protective equipment to apply. Only had limited success when applied and was not effective at all on a long-term basis. Product did not kill weeds, only burned the edges. Several applications were made in an attempt to kill tap rooted weeds, such as dandelions. Additionally this product lowers the PH of the soil when applied and can harm non target landscape plants and water resources.

**Waipuna Machine:** Hot water/foam machine. Hot water melts away waxy coating on weed leaves or breaks down the plants cellular structure. Plants are unable to retain moisture and dehydrate within a few days.

**Impact:** This machine is very expensive and purchasers of the machine have reported it to be only marginally successful. Other piloted cities that were contacted did not recommend purchasing the machine.

*\*practice no longer used*