INDUSTRY TASK FORCE II ON
2,4-D RESEARCH DATA

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Issue Backgrounder

BENEFITS OF THE WORLD'S MOST WIDELY USED HERBICIDE

Some 60 years have passed since the original patent was issued to Dr. Franklin D. Jones in 1945 for his discovery of the herbicide 2,4-dichlorophenoxyacetic acid (2,4-D). A herbicide doesn't reach this milestone without a significant health and environmental safety record and many recognized benefits.

Extensively tested for health and safety

Very few compounds have been as thoroughly evaluated for health and safety. "*2,4-D is possibly the most extensively researched of all pesticides and the data have been examined by an unusual number of advisory committees and work groups*," stated an expert review of 2,4-D prepared for the British Columbia Ministry of Forests.

With the total number of research studies reported to be in excess of 40,000, there are now more than 140 peer-reviewed published epidemiologic studies specific to 2,4-D. The majority of these epidemiologic studies have been undertaken by government agencies or university researchers independent of industry. As a result of this massive body of scientific evidence, the characteristics of 2,4-D are well understood.

In August 2005, the Environmental Protection Agency completed the reregistration assessment of 2,4-D. The EPA concluded that 2,4-D does not present risks of concern to human health when users follow its product instructions.

Since 1986, more than a dozen government and expert panels, including the World Health Organization, European Commission, Harvard University School of Public Health, University of Michigan School of Public Health and USDA/University of Minnesota School of Public Health. Importantly, not one regulatory agency mandated with protecting public health in the world identifies 2,4-D as a human carcinogen.

Low-cost, effective weed control

There are many reasons 2,4-D is one of the most widely used herbicides in the U.S. and worldwide protecting agricultural crops, non-crop and aquatic areas, turf grass and environmentally sensitive areas from weeds and invasive species. First and foremost, after 60 years on the market, users trust the herbicide to effectively control a broad spectrum of broadleaf weeds (see attached Tables 1, 2, 3: Weed

Susceptibility charts). Given the wide range of weed control and uses, there are over 1500 products that have 2,4-D registered as the active ingredient.

Protecting the turf we live, work and play on

One misperception about lawn herbicides is that their use came about after initial discovery for agricultural crop protection. This is simply not the case with 2,4-D. The original patent for 2,4-D in 1945 was for weed control in lawns and field crops.

Initial tests of 2,4-D were conducted in 1944 on a lawn infested with dandelions and resulted in selective broadleaf weed control with no injury to the turf grass. Additional studies were done on a golf course also showing exceptional weed control. In 1945, a developmental program was conducted with the United States Golf Association and on turf grass of the National Capital Park Service including the White House lawn. During the same year, workers at various state agricultural experiment stations began the first extensive field testing of 2,4-D on crops.

Millions of acres of lawn and landscapes around homes, businesses, roadsides, parks, athletic fields, and golf courses improve our quality of life by providing open spaces, recreation, enhanced property values and the conservation of important natural resources.

2,4-D based herbicides helps control weeds giving turf grass a chance to grow into a healthy lawn, a vibrant landscape or a cushioned playing field. Healthy turf grass filters groundwater, absorbs pollutants, hinders the spread of fire and acts as a cooling agent around buildings while also providing space for outdoor activities.

Use of 2,4-D is also beneficial for controlling weeds such as common ragweed that cause allergies to humans. It also controls many weeds poisonous (e.g., poison ivy and poison oak) to humans and animals.

2,4-D protects our green spaces allowing us to live, work and play in weed-free, healthy environments.

Protecting our food crops

Weeds are the number one pest problem in crop production because they reduce crop yields and increase production costs. 2,4-D is effective and economical in controlling weeds and helps reduce manpower and horsepower requirements that effect fuel consumption and erosion-producing tillage in crop production.

Use of 2,4-D prior to planting soybeans and corn has been an important factor in making no-till production feasible in farming. No-till is a system for planting crops without preplant tillage, using herbicides to control weeds and resulting in reduced soil erosion and the preservation of soil nutrients.

2,4-D controls existing vegetation prior to planting no-till soybeans. The number of no-till soybean acreage has increased dramatically in recent years to help farmers comply with federal plant residue mandates for soil conservation and to

reduce production costs. Use of 2,4-D prior to planting no-till corn helps assure success of no-till crop production and results in significant conservation of soil, water, fuel, equipment and labor.

Wheat and small grain weed control

Weeds may affect small grain production in many ways. Small grain yields of, wheat, barley, oats and rye, may be reduced significantly when weeds compete with small grain plants for light, water, and minerals. Weeds may also inhibit crop growth through release of allelopathic chemicals that are toxic to grain plants. Weeds or weed seeds contaminating harvested grain may reduce quality. In addition, weeds may interfere with harvesting or raise the moisture content of the harvested grain, leading to damage from heat and pests in storage.

2,4-D controls a wide range of broadleaf weeds in all varieties of winter, spring and durum wheat; see Weed Susceptibility tables for weed listings.

Keeping vegetables, fruits and nuts weed-free

2,4-D herbicide economically and effectively controls broadleaf weeds growing in between rows of fruit and vegetable fields and on orchards floors. The herbicide is primarily used for weed control in asparagus, apples, peaches, almonds, pears, strawberries (dormant application), cherries and cranberries; and as a growth regulator in potatoes. As Americans are encouraged to add more fruits, vegetables and nuts to their diets, it's important that tools, such as 2,4-D herbicide, that aid in their abundant availability remain affordable and effective.

Range and pastureland weed protection

2,4-D eliminates broadleaf weeds from range and pastureland without damaging desirable grasses that livestock feed upon. The herbicide improves grass production by reducing weed competition, allowing for more quality grass and increased grazing options. It provides a healthier grazing environment to help ranchers lower feed costs and feed more cattle. An abundant supply of high-quality forage can deliver profitable results, like enhanced body condition for faster breed-back and higher conception rates, healthier nursing calves, improved weaning weights, and overall better beef production.

Controlling invasive, noxious and non-native weeds

The U.S. Geological Survey reports that some $20 billion in damages can be linked to invasive plant life. This affects not only those who make their living directly off the land, but also citizens of cities, suburbs and rural America.

An *invasive species* is one that spreads into areas where they are not native. This includes non-native species that escape or otherwise grow outside cultivation. Not all non-native plants are invasive. *Noxious weed* is a legal term used by county, state, and federal agencies to denote non-native plants that pose serious threats to

agriculture, wildlife, and roadsides. Since these weeds are not native, they have no natural competitors to keep them from overtaking the native environment.

Non-native species are defined as ones that were directly or indirectly introduced to a given region, were not present in the region before and would not have spread into the area without outside interference, i.e., humans or animals.

According to the U.S. Department of Agriculture, when invasive species enter new ecosystems, "*they can grow, adapt, proliferate and spread ... indefinitely, causing ever increasing economic and environmental damage*."

Keeping weeds out of waterways

Aquatic weeds that grow in ponds, lakes, reservoirs, canals, streams and rivers can have detrimental effects on water usage and the wetlands environment. The appearance of the water as well as recreational activities such as boating, fishing and swimming can be adversely impacted. Fish spawning grounds and wetlands habitat for wildlife can be destroyed, hydroelectric screens can be clogged, navigation lanes restricted, water quality can be significantly reduced and property values can fall sharply because of too much aquatic vegetation.

2,4-D is an effective and economical way to manage aquatic weeds. The herbicide is a relatively fast-acting, systemic, selective herbicide used for the control of Eurasian water milfoil, water hyacinth and other broad-leaved species, leaving native aquatic species relatively unaffected.

Protecting our forests

Herbicides became the vegetation management tool most widely applicable for forestry use because of their efficacy, safety, and low cost. Traditional mechanical methods of weeding forests are dangerous to workers, costly, and labor-intensive. They require cutting tools, heavy mechanical equipment, and heavy fuel usage.

2,4-D is an important tool for stump treatment, trunk injection and selective control of brush in conifer forests. It is also a component of numerous mixtures for site preparation. 2,4-D is also used for many other purposes in forested areas, including trail preservation, management of wildlife habitat, campground clearance and weed control near outbuildings.

Vegetation management along highways, railroads and rights-of-way

2,4-D helps manage unwanted weeds and brush along roadways, rights-of-ways and railroads.

Safety is paramount along highways and roads. Vegetation management using 2,4-D helps ensure motorist safety by controlling encroaching weeds and brush that can conceal road signs and affect driver visibility. Vegetation management stops weeds and brush roots that crack and buckle road surfaces.

Safety is also essential in railroad transportation which involves heavy equipment moving at high speeds. Weeds reduce train traction and hide damaged equipment during routine inspections. Encroaching brush can also limit motorist line-of-sight at railroad crossings. Vegetation can cause drainage problems that lead to deteriorating ties and destabilized track beds.

For an electrical utility to maintain its effectiveness, it must limit service interruptions along electric line rights-of-way. Vegetation management using 2,4-D plays a major role in ensuring that branches do not contact powerlines and prevent electricity from reaching the consumer. Safety remains another problem when trees touch transmission and distribution lines. Finally, well maintained rights-of-way offer aesthetic value to the community and provide beneficial wildlife habitat.

A clear line-of-sight remains important for proper gas and oil pipeline maintenance. During regular inspections conducted from aircraft or ground vehicles, crews can spot leaks or problems. Even routine maintenance becomes difficult if crews can't easily access pumps, gates and valves. Vegetation management also positively affects the safety of work crews that must access pipelines.

The value of 2,4-D to the U.S. economy

The value derived from an herbicide that has as many uses as 2,4-D can be difficult to quantify. But a U.S Department of Agriculture study did show the potential cost to society if 2,4-D were taken off the market. The 1996 study concluded that if 2,4-D were no longer available, the cost to growers and other users in terms of higher weed control expenses, and to consumers, in the form of higher food and fiber prices, would total *$1.6 billion annually* in the U.S. alone.

It's no wonder why in 2004, curators of The Henry Ford organization, a multi-venue destination founded by automotive pioneer Henry Ford, identified the discovery of 2,4-D as one of the 75 most important innovations in the past 75 years.

Table 1

2,4-D WEED SUSCEPTIBILITY

<u>Excellent</u> Control - Highly Susceptible

Type of Plant – Annual

Alyssum, Yellow
Beggarticks, Devils
Leafbract
Nodding
Tall
Bloodweed
Bur-head
Carpetweed
Cinquefoil, Rough
Cocklebur, common
Cornflower
Cress, mouseear
Croton
Devils Claw
Dill
Galinsoga
Goosefoot
Groundcherry, Wrights
Groundsel, Cressleaf
Jewelweed
Lambsquarter
Lettuce, Wild
Loco, bigbend
London rocket
Morningglory, Common
Mustard, Black
Hedge
Indian
Tumble
Wild
Pennycress, field
Pepperweed, field
Pigweed, Redroot
Pursley, Florida
Ragweed, Blood
Lanceleaf
Sida, prickly
Sowthistle, Annual
Spiny
Spanishneedles
Sunflower
Sweetclover, annual yellow
Tansymustard
Thistle, Blessed
Vetch, Narrowleaf
Wild
Witchweed

Type of Plant – Biennial

Beggarticks, Bearded
Burdock, Common
Great
Woolly
Hollyhock
Mustard, Wormseed
Thistle, Bull
Milk
Thistle, Musk
Pasture
Wormwood, Biennial

Type of Plant – Perennial

Aster, Slender
Dandelion
Dock, Fiddle
Groundsel, Riddell
Milkvetch, cicer
Plantain, Broadleaf
Buckhorn
Sorrel, Heartwing
Vervain, Blue
Prostate
Wintercress, early

Type of Plant – Woody

Coffeeweed

Table 2

2,4-D WEED SUSCEPTIBILITY

Good Control - Susceptible

Type of Plant – Annual

Bittercress, hairy
Buttercup, Corn
Chickweed, Sticky
Cockle, Cow
Fennel, dog
Fiddleneck, coast
Filaree, redstem
Galinsoga, hairy
Hemp
Mallow, Venice
Mustard, Treacle
Nettle, Tall
Peavine
Pigweed, Prostate
Radish, Wild
Shepherdspurse
Smartweed, Ladysthumb
Pennsylvania
Thistle, Italian
Russian
Velvetleaf
Wormwood, annual

Type of Plant – Biennial

Hemlock, Poison
Thistle, Marsh
Plumeless
Western

Type of Plant – Perennial

Aster, Many-flowered
Smooth
Bindweed, Field
Hedge
Blackeyed Susan
Blueweed, Texas
Bullnettle
Burroweed
Buttercup, Creeping
Tall
Catnip
Chicory
Cinquefoil, Common
Sulfur
Crown vetch
Daisy, English
Dock, Pale
Fieldcress, yellow
Fireweed
Healall
Knotweed, Sakhalin
Loco, Blue
Woolly
Lupine, Tailcup
Milkvetch, Nuttail
Milkweed, bloodflower
Mint, field
Nettle, Stinging
Povertyweed
Ragweed, Western
Ragwort, Tansy
Sage, Creeping
Purple
White
Sorrel
Thistle, Flodman
Wavyleaf
Vervain, Hoary
Roadside
Vetch, Milk
Water Hyacinth
Water Hemlock

Table 3

2,4-D WEED SUSCEPTIBILITY

Fair Control – Limited Susceptible

Type of Plant – Annual

Buckwheat, Wild
Buffalobur
Buttercup, Celery leaf
Chickweed, Common
Clover, hop
Dayflower
Fleabane, Annual
Goosefoot, Jerusalem-oak
Gooseweed
Horseweed, marestail
Knotweed, Silversheath
Mallow, Little
Mayweed, dogfennel
Medic, Black
Mustard, Blue
Nightshade, Black
Nightshade, Cutleaf
Pigweed
Pineappleweed
Purslane, common
Ragweed, Common
Giant
Sesbania, Coffeebean
Snow-on-the-mountain

Type of Plant-Biennial

Carrot, Wild
Houndstongue
Knapweed, Spotted
Mullein, Moth
Thistle, Blue
Bristly

Type of Plant – Perennial

Alyssum, Hoary
Aster, Whiteheath
Bulrush
Cattail, Broadleaf
Narrowleaf
Chickweed, Field
Mouseear
Cinquefoil, Blueleaf
Clover, White
Cress, hoary
Daisy, Oxeye
Dock, Broadleaf
Curly
Veiny
Dogbane, hemp
Fleabane, Oregon
Garlic, Wild
Goldenrod
Groundcherry, Smooth
Ground-ivy
Groundsel, Arrowleaf
Threadleaf
Hogpotato
Honeysuckle
Jerusalem Artichoke
Knapweed, Black
Brown
Squarrose
Lettuce, Blue
Locoweed, white
Lupine, Silver
Mallow, Dwarf
Milkweed, Broadleaf
Climbing
Morningglory, Bigroot
Nutsedge, Yellow
Onion, Wild
Pepperweed, Perennial
Pokeweed
Sowthistle, Perennial
Tansy
Thistle, Canada
Yellowspine
Wormwood, Louisiana
Yellow rocket

Type of Plant – Woody

Poison Ivy
Poison Oak