

2,4-D: An in-depth understanding

2,4-D is a member of the phenoxy family of herbicides and was the one of the first successful selective herbicides developed. It is generally accepted that four different researchers – working independently in the United Kingdom and the United States and – discovered this class of auxin herbicides in the early 1940s. Their discoveries “transformed agriculture and are considered to be amongst the greatest scientific discoveries” of the twentieth century¹.

In February 1942 one of its inventors, Dr. Franklin D. Jones, was researching ways to find an agent to control poison ivy, motivated not only by commercial interests, but also by the fact that his children were highly sensitive to this poisonous plant. He began experimenting with the plant growth hormone, indoleacetic acid (IAA), a naturally occurring compound that can be found in most plants. Since IAA proved far too unstable to work effectively, Dr. Jones developed a synthetic version of IAA – namely 2,4-D.

After the U.S. patent was issued on December 11, 1945, it was introduced commercially in 1946, and rapidly became the most widely used herbicide in the United States. 2,4-D has provided economical, effective, post-emergence control of broadleaf weeds in a large variety of crops and in non-croplands for the past six decades. Control of broadleaf weeds in turf grass was recognized as an important benefit by golf superintendents and grounds managers as early as 1945².

In testing 2,4-D he discovered that it didn't increase plant development quite as expected, but instead, at higher doses it killed broadleaf plants (dicots) with no adverse consequences on grasses and other monocots. While 2,4-D may not have succeeded primarily to increase plant development, its introduction as a herbicide (and sometimes a plant growth regulator) has increased world food production by helping to control pernicious weeds and other broadleaf plants. The discovery also laid the foundation for a tremendous amount of 2,4-D research in toxicological and environmental sciences.

Its uses in agriculture are on wheat and other small grains, sorghum, corn, rice, sugar cane, low-till soybeans, rangeland, pasture, and numerous minor crops. It is also used on rights-of-way, roadsides, non-crop areas, forestry, lawn and turf care, and on aquatic weeds. A major use of 2,4-D today is in combination with other herbicides because it economically enhances the weed control spectrum of many herbicides.

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 years
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When used as directed, 2,4-D controls many broadleaf weeds including carpetweed, dandelion, cocklebur, horseweed, morning glory spp., pigweed spp., lambsquarters, ragweed spp., shepherd's-purse, and velvetleaf, with little to no activity against grasses. Aquatic weeds controlled include Eurasian water milfoil, water hyacinth, bulrush, bladderwort, and water lily.

After 70 years of use, 2,4-D is still the third most widely used herbicide in the United States and Canada, and the second most widely used worldwide. In 2004, The Henry Ford organization in Dearborn, Michigan declared 2,4-D as one of the 75 most important innovations in the previous 75 years. 2,4-D's long history has proven its quality and usefulness as a broad-spectrum, versatile tool.

About the Task Force

The Industry Task Force II on 2,4-D Research Data is organized to provide funding for some 300 Good Laboratory Practice (GLP) research studies required to respond to the EPA re-registration and PMRA pesticide re-evaluation programs. The 2,4-D Task Force is comprised of those companies owning the technical registrations on the active ingredient in 2,4-D herbicides. They are Dow AgroSciences (U.S.), Nufarm, Ltd. (Australia) and Agro-Gor Corp., a U.S. corporation jointly owned by Albaugh, Inc. (U.S.) and PBI Gordon Corp. (U.S.).

References:

¹ Fryer, JD, Foreword in C. Kirby, *The Hormone Weedkillers, A Short History of Their Discovery and Development*. British Crop Protection Council, 1980. For a more complete history of 2,4-D, see:

<http://www.agron.iastate.edu/courses/agron317/2005/readings/2,4Dhistory.pdf>

² United States Golf Association Green Section, *Timely Turf Topics*, July 1945, see:

<http://turf.lib.msu.edu/1940s/1945/4507.pdf>

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