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| **2,4-D** | **Product Type:** | **Class:** | **Sales ($m.):** | **Launch Date:** |
| Herbicide | Phenoxyacetic acid | 585 | 1945 |
| **Key Manufacturer / Brand:** | **Other Manufacturers:** | | **Structure** | |
| Nufarm (2,4-D) | Dow, Atul, UPL, Adama, Nitrokemia, Agro-San, Ancom, Amvac, Atanor, Meghmani, CAC Group | |
| **Application** | **Timing:** Post-Emergence | **Rate – (g/ha):** 200-2000 |
| **Main Crops** | **Main Pests** | |
| Cereals, Non-crop, Maize, Soybean, Rice, Sugarcane | Broadleaved weeds | |
| **Main Mixture Partners :** MCPA,MCPP, cinidon ethyl, dicamba, florasulam, fluroxypyr, bromoxynil, triclopyr, pinoxaden, clodinafop | | | | |
| **Recent History:**  2,4-Dichlorophenoxyacetic acid (2,4-D) is a mature, commodity herbicide, although it remains an important product in low-cost broadleaf weed control strategies across a wide range of crops. There are a number of different formulations of 2,4-D for numerous end use products, primarily as a sole active ingredient but also in conjunction with mixture partners. It has achieved full re-registration in the EU, with an extension to the current approval granted to the end of 2015. Re-registration was gained in Canada in 2008. Nufarm holds a major market share which was further strengthened with the purchase of BASF’s phenoxy business in 2004 and the UK-based AH Marks in 2008. The company launched a new formulation and commissioned a new production facility for the product in India in 2012.  Dow is in the process of commercialisation of corn, soybeans and cotton tolerant to 2,4-D and glyphosate under the Enlist brand, and has further developed soybeans tolerant to 2,4-D, glyphosate and glufosinate under the Enlist E3 brand. The Enlist Duo herbicide component of this weed control system, which has received approval in the USA and Canada, contains glyphosate and Colex-D, based on the choline salt of 2-4,D. Enlist One (2,4-D choline) is scheduled for US launch on maize, soybean and cotton in 2018. The Enlist trait in corn and soybeans has been approved in Canada and the USA with commercial launch in corn expected in the USA in 2018, whilst Enlist E3 soybeans have received approval in the USA and Argentina. Enlist cotton was launched in the USA at the beginning of 2016. | | | | |

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| **2,4-DB** | **Product Type:** | **Class:** | **Sales ($m.):** | **Launch Date:** |
| Herbicide | Phenoxyacetic acid | <30 | 1945 |
| **Key Manufacturer / Brand:** | **Other Manufacturers:** | | **Structure** | |
| Nufarm (Embutox, Butyrac) | Cedar Chemicals, UPL, Atanor | |
| **Application** | Timing: Post-emergence | **Rate – (g/ha):** 200-1700 |
| **Main Crops** | **Main Pests** | |
| Non-crop, Rice, Cereals | Broadleaved weeds | |
| **Main Mixture Partners :** | | | | |
| **Recent History:**  2,4-D analogue which is of little commercial significance, with the main crop outlets being cereals and rice. Nufarm and Aceto acquired the US rights to the product from Adama in 2004. EU approval, submitted by Nufarm, was renewed for 15 years in 2017 for use on cereals and legumes. | | | | |

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| **Abamectin** | **Product Type:** | | **Class:** | **Sales ($m.):** | **Launch Date:** |
| Insecticide | | Natural product | 430 | 1985 |
| **Key Manufacturer / Brand:** | **Other Manufacturers:** | | | **Structure** | |
| Syngenta (Vertimec, Avicta) | Chinese companies, Nortox, Sinon, Amvac | | |
| **Application** | Timing: | Foliar,  Seed treatment | Rate – (g/ha): 5-450 |
| **Main Crops** | **Main Pests** | | |
| F&V | Leaf miners and a range of insects and mites | | |
| Cotton, Soybean, Rice | Lepidoptera, thrips, mites, nematodes | | |
| Pome fruit, Vine, Cereals | A wide range of insects and mites | | |
| **Main Mixture Partners :** thiamethoxam, chlorantraniliprole | | | | | |
| **Recent History:**  Avermectin insecticide/acaricide derived from the fermentation of *Streptomyces avermitilis*, acquired by Novartis from Merck in 1997 and now a significant element in Syngenta’s insecticide portfolio. In 2007 Syngenta acquired the exclusive license for Merck’s manufacturing technology for the product. Abamectin achieves translaminar absorption and hence has activity against leaf eating insects and mites. The product also finds major use in the animal health sector. EU re-registration has been achieved. Generic competition is now widespread: Adama gained the first generic registration in the USA in 2004, with Rotam introducing two formulations in the same year. Rotam later launched Acarimik in 2009 and Abacus V in California in 2014. Adama launched a low volatile organic compound formulation in the US in 2012 as Abba Ultra. Amvac acquired avermectin from Adama in June 2017.  The seed treatment product Avicta was introduced in the USA by Syngenta in 2005 for nematode control in cotton, followed in 2009 for use on maize and in 2010 for soybean. Syngenta entered into an agreement with Dow’s Mycogen subsidiary in 2010 in which Mycogen will offer Avicta on SmartStax maize in the USA. Avicta was also launched in Argentina in 2010. Agri-Flex, a mixture with thiamethoxam, was approved in 2010 for use on citrus in the USA and Voliam Targo, a mixture with chlorantraniliprole, was launched in Italy and Turkey in 2012 and in Spain in 2017. In 2015 Syngenta Canada launched a new formulation of Agri-Mek SC for use in speciality and horticultural crops. The following year Agri-Mek SC was approved for use on soybean in the USA. | | | | | |