



US009408384B2

(12) **United States Patent**
Sun et al.

(10) **Patent No.:** **US 9,408,384 B2**
(45) **Date of Patent:** ***Aug. 9, 2016**

(54) **WATER-SOLUBLE GRANULE FORMULATION OF 2,4-D SALT AND PREPARATION METHOD THEREOF**

6,579,831 B1 6/2003 Harwell
7,094,734 B2 8/2006 Ushiguchi et al.
7,883,715 B2* 2/2011 Abraham et al. 424/405
2010/0248962 A1 9/2010 Wilczynski

(75) Inventors: **Guoqing Sun**, Weifang (CN);
Yongsheng Hou, Weifang (CN); **Yong Wu**, Weifang (CN); **Liwei Xu**, Weifang (CN); **Shuai Chen**, Weifang (CN)

FOREIGN PATENT DOCUMENTS

CN 1040728 3/1990
CN 1206330 1/1999
CN 1537427 10/2004
CN 1608465 4/2005
CN 101326918 12/2008
CN 101690498 4/2010
CN 102301997 1/2012
JP 2011201780 10/2011

(73) Assignee: **Shandong Weifang Rainbow Chemical Co., Ltd.**, Weifang, Shandong Province (CN)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

This patent is subject to a terminal disclaimer.

OTHER PUBLICATIONS

CN 102301997A, Wei et al. machine translation of One kind of 2,4-D particle herbicidal compound and preparation method, 1997.*
Li, Chunx, "Study of weeding non-arable weeds by 90% drop acid Ammonium glyphosate soluble granules", Shanghai Agricultural Science and Technology, 2011, 4.
Song, Bin, "Study on Weed Control of 56% MCPA-Na SP in Wheat Field", Journal of Anhui Agricultural Sciences, Jun. 25, 2004, 32(3):466.
Yuan, Huifu et al., "Screening of the Weed Killer in the Naked Oats Field of the Hebei Northwest Region", Journal of Henan Agricultural Sciences, Nov. 15, 2009, 11:90-93.
International Search Report for PCT/CN2012/000582 dated Oct. 15, 2012.

(21) Appl. No.: **14/119,503**

(22) PCT Filed: **May 2, 2012**

(86) PCT No.: **PCT/CN2012/000582**

§ 371 (c)(1),
(2), (4) Date: **Nov. 22, 2013**

* cited by examiner

(87) PCT Pub. No.: **WO2013/106972**

PCT Pub. Date: **Jul. 25, 2013**

Primary Examiner — Alton Pryor

(65) **Prior Publication Data**

US 2014/0323308 A1 Oct. 30, 2014

(74) Attorney, Agent, or Firm — Andrus Intellectual Property Law, LLP

(30) **Foreign Application Priority Data**

Jan. 19, 2012 (CN) 2012 1 0016942

(57) **ABSTRACT**

(51) **Int. Cl.**
A01N 39/02 (2006.01)
A01N 39/04 (2006.01)
A01N 37/38 (2006.01)

The present invention discloses a water-soluble granule formulation of 2,4-D salt, comprising components in the following weight percent: 5-80% 2,4-D salt (calculated as 2,4-D acid), and a water-soluble filler as the balance. The water-soluble granule formulation of 2,4-D salt has an outstanding control efficiency on annual or perennial Poaceae weeds and some broadleaf weeds in fields of soybean and other Fabaceae plants, for example, such weeds as amaranth, knotweed, lamb's-quarters night shade, siberian cocklebur, barnyard grass, foxtail grass, digitaria sanguinalis, broomcorn millet and the like. The formulation is environment-friendly, and has the advantages of being free of organic solvents and dusts and being easy to measure in comparison to conventional emulsifiable formulation, wettable powder formulation and suspension formulation. The present invention also discloses the preparation method of the formulation. The production process is simple, economical and safe. The whole production process, without the use of dangerous chemicals, is easy to control and operate and has a high safety factor.

(52) **U.S. Cl.**
CPC **A01N 37/38** (2013.01); **A01N 39/04** (2013.01)

(58) **Field of Classification Search**
CPC A01N 37/36; A01N 39/04
See application file for complete search history.

(56) **References Cited**

U.S. PATENT DOCUMENTS

5,441,923 A 8/1995 Tocker
6,022,829 A * 2/2000 Mito 504/134
6,387,388 B1 5/2002 Misselbrook et al.

13 Claims, No Drawings