Product Data Sheet

Solubor® DF

Soluble microgranular borate for crop nutrient sprays
Sodium borate
Solubor DF protects against boron deficiency

20 MULE TEAM BORAX™
RioTinto

Background

Boron is one of seven micronutrients essential to all plant growth. Its role was recognised first in the 1920s and since that time, boron deficiency has been recognised in a wide range of crops.

Correcting boron deficiency

Boron deficiency can be remedied by the correct application of a borate containing material in solid or liquid fertilisers, to the seedbed in annual crops or under the foliar canopy of perennial crops. Perennial and annual crops can also be sprayed with boron containing solutions. These are normally tank mixed with other micronutrients or with agrochemical products.

The latter method of application may be preferable since at peak requirement times the boron needs of the growing plant can frequently exceed its ability to obtain its needs through the roots. Mixing with other sprays as part of a programme enables the grower to time this availability and save application cost.

Detecting boron deficiency

Boron deficiency shows in clearly defined ways in certain crops. Generally, by the time visible symptoms are seen, yields will already have been adversely affected. The best way to establish need is either through soil testing or through tissue analysis. In this way, boron supplementation can form part of a 'balanced nutrition' approach to crop fertilisation.

Predicting boron deficiency

Certain crops world-wide are known to be more susceptible to lack of boron than others. These are shown in the tables.

Susceptible		
Alfalfa (Lucerne)	Cotton	Red Beet
Apple	Eucalyptus	Rutabaga
Broccoli	Grape	Sugar beet
Carnation	Groundnut	Sunflower
Cauliflower	Mangold	Swede
Carrot	Oil palm	Turnip
Celery	Oilseed rape	Vinew
Chrysanthemum	Olive	
Coffee	Pine	

Moderately susceptible		
Banana	Cocoa	Pear
Brussels sprout	Coconut	Poppy
Cabbage	Flax linseed	Potato
Chinese cabbage	Hop	Tea
Citrus	Maize corn	Tobacco
Clover	Papaya	Tomato

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There are several factors which need to be taken into account when boron deficiency may be suspected:

- High rainfall
- Recent liming (pH over 6.6)
- Previous cropping
- Boron removal by previous crops
- No boron nutrition
- Sandy soils
- High organic matter

Additional reading

Boron Deficiency—Its Prevention and Cure, de V.M. Shorrocks (available upon request from U.S. Borax)

Mineral Nutrition of Higher Plants, de Horst Marschner, Academic Press.

Boron and its Role in Crop Production, de Umesh C. Gupta. CRC Press.

Composition

Mixture of:
Boric Acid, H_3BO_3
Borax Pentahydrate, $Na_2B_4O_7 \cdot 5H_2O$ and Sodium Pentaborate, $Na_2B_{10}O_{16} \cdot 10H_2O$

Appearance

White, free flowing granules.

Average bulk density

700-720 kg/m^3

pH buffering action

Aqueous solutions of *Solubor* DF range from mildly alkaline at low concentrations to practically neutral as concentration increases.

Packaging

Solubor DF is available in 5, 12 and 25 kg polyethylene sacks.

Chemical specification		
	Typical	Guarantee
Water soluble boron, B%	17.5	17.2 - 17.8
Equivalent B_2O_3% (Boric oxide)	56.4	55.4 - 57.3
Na_2O% (Sodium oxide)	10.0	9.5 - 10.5

Sieve specification	
Mesh size mm	Percent retained guarantee
0.30	2.0

Percent *Solubor*® DF by weight of solution	pH at 23°C
0.5	8.3
1.0	8.3
2.0	8.1
2.5	8.0
5.0	7.8
7.5	7.6
10.0	7.4

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Main uses

- As a spray treatment to prevent the occurrence of boron deficiency in susceptible crops
- To provide boron through irrigation, fertigation or hydroponics where these systems are used

Solubor DF is used on numerous crops as a routine treatment or where a specific need has been identified. These include:

Field crops: alfalfa/lucerne, cotton, corn/maize, oilseed rape, sugar beet, sunflower

Tree crops: apples, citrus, coffee, olives, vines

Vegetables: cabbage, carrots, cauliflower, celery, red beet

It is mainly used as a spray to the soil at planting or as a foliar spray in the young crop.

Advantages

Free flowing microgranular formulation

Solubor DF with a consistent particle size of 0.3 mm is a flowable product which for the first time enables a solid boron fertiliser to be poured into induction bowl systems.

Whether introduced to the sprayer from the top filler or induction bowl, *Solubor* DF can significantly reduce down time between loads.

Non dusty

A consistent granule size of 0.3 mm ensures significant reduction in dust.

Easy to handle packaging

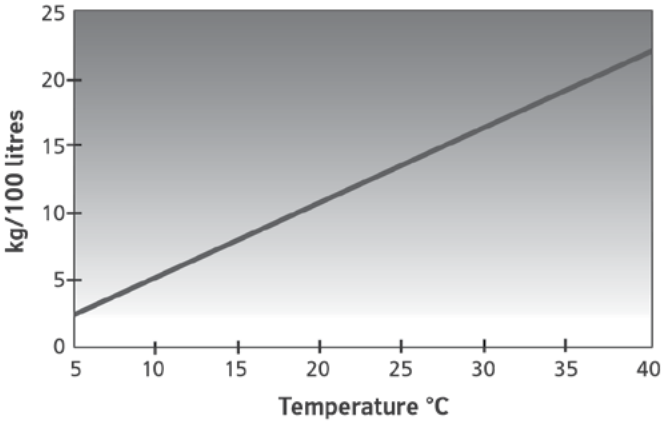
The particle size and flowability permit *Solubor* DF to be packed in polyethylene sacks of 5, 12 and 25 kg sizes. The feedback from growers is that the 12 kg size is particularly convenient to handle from the pallet into the sprayer.

The polyethylene bags have the added advantage of weatherproof protection for the product.

High solubility

Solubor DF is formulated to give very high solubility levels and ensure speedy mixing. Dissolution rate is a function of concentration, agitation and water temperature. Exercise caution when mixing high dose rates in low water volumes at low temperatures. The dissolution rate will depend on factors such as pouring rate and the equipment involved, ambient and water temperatures. The graph below showing dissolution at different temperatures, can be used as a guide.

Solubility in water



Compatibility

Solubor DF is compatible with most agrochemicals and liquid fertilizers. It has been tested in conjunction with more than 250 products and compatibility lists are available from your distributor.

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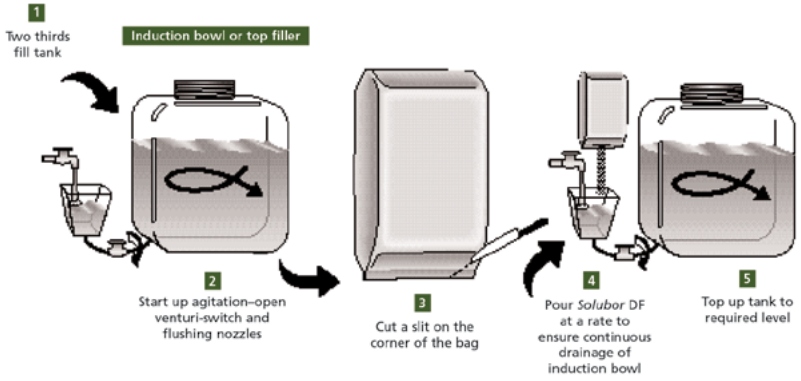
Recommendations for use

Solubor DF should be dissolved in water and applied as a spray to the soil or to the crop. It may be poured directly into the induction hopper or the spray tank filler. It is essential to use a generous supply of water and adequate flow through the induction hopper. Whether *Solubor* DF is fed into the hopper or directly into the tank, strong agitation must always be maintained throughout the mixing and spray operations.

Use as directed. Do not exceed recommended rates or a maximum dose rate of 4 kg boron (24 kg *Solubor* DF) per hectare per year.

For dose rates on crops other than those mentioned, please contact your distributor.

Mixing instructions



Application Rates			
Crop	Solubor®DF kg/ha	Volume water l/ha Soil	Foliar
Sugar beet	6-18	200	300
Oilseed rape	6-14	200	300
Vegetable brassicas	6-12	–	500
Apple & Pear	3 x 2.4	–	800-2000