



SUPERFECT®

8.8% Phosphorus (P)

11 % Sulphur (S) as sulphate

Australian made single superphosphate (SSP) fertiliser

Ideal for top-dressing grass-legume pastures

MANUFACTURE

The invention of superphosphate is said to mark the birth of the modern fertiliser industry. Prior to this, naturally occurring ores and plant and animal wastes were the primary ways of adding nutrients to the soil. Bones and phosphate rock were commonly used as a source of phosphorus.

The manufacture of superphosphate involves treating phosphate rock with sulphuric acid to increase the solubility of the phosphorus it contains, making it more available for plant uptake.

Naturally occurring phosphate rock contains a high proportion of calcium phosphate $\text{Ca}(\text{PO}_4)_2$ which is normally not sufficiently water-soluble to be used as a fertiliser. The treatment of phosphate rock with sulphuric acid converts it to calcium dihydrogen phosphate $\text{Ca}(\text{H}_2\text{PO}_4)_2$, a water-soluble form that plants can use. It also adds sulphur (S), another essential plant nutrient, to the finished product. Sulphur is important in perennial legume-based pastures.

John Lawes took out a patent for the manufacture of superphosphate in the United Kingdom in the 1840s. The royalties he received were used to establish the Rothamsted Research Station, the oldest agricultural research station in the world and the site of many internationally recognised long-term experiments.

Superphosphate, more correctly called single superphosphate (SSP), was first manufactured in Australia in Victoria in 1876. James Cuming (Victoria) and George Shirley (NSW) were among the early pioneers of the Australian superphosphate industry. Incitec Pivot Limited can trace its origins to these times, with antecedent companies having been involved in the fertiliser industry for over 100 years.

Superphosphate became and remained Australia's most important phosphorus fertiliser on crops and pastures until the 1970s. Since then, its cost competitiveness compared to other phosphorus fertilisers has declined. Superphosphate remains popular in legume-based pastures, but higher analysis ammonium phosphate fertilisers have replaced it in cropping, i.e. MAP and DAP.

Incitec Pivot Limited manufactures superphosphate at Geelong in Victoria from imported phosphate rock. The end product is known as SuPerfect®. Superphosphate is no longer manufactured in South Australia, New South Wales, and Queensland. These plants have closed.

SuPerfect® is an important pasture topdressing fertiliser, e.g. on dairy farms. Victoria is Australia's major dairying State.

USE OF SUPERPHOSPHATE AS A FERTILISER

SuPerfect® contains approximately equal amount of phosphorus and sulphur. As plants also contain approximately equal amount of phosphorus and sulphur, this make SuPerfect® an ideal fertiliser where both phosphorus and sulphur are required, e.g. for top-dressing grass-legume pasture.

As a source of phosphorus, SuPerfect® costs more per kg of phosphorus (P) than higher analysis alternatives, e.g. DAP and MAP. This is one of the reasons why superphosphate has declined in popularity as a cropping fertiliser. However, when value is placed on its sulphur (S) and/or calcium (Ca) content, SuPerfect® is more cost competitive, and becomes more attractive to use. DAP and MAP are low in sulphur.

In high rainfall areas, the main reserve of sulphur in the soil is the soil organic matter. When the soil is cultivated, the breakdown (mineralisation) of soil organic matter is increased and sulphur is released. Smaller amounts of sulphur become available where the soil is not cultivated or disturbed. Consequently, sulphur is more likely to be required in fertiliser programs in perennial pastures than in crops where the land is fallowed before planting.

Furthermore, legumes are high in protein, and have a high sulphur requirement. Sulphur is an important constituent of protein. Consequently, sulphur usually needs to be applied in pasture fertiliser programs and is less likely to be required in cropping.

The main topdressing seasons for pasture are the autumn and spring. Topdressing is avoided over summer. Many pasture species are dormant at this time of year in southern Australia where the rainfall is winter dominant. There is also a risk of nutrient loss in run-off in the event of heavy storms after application.

With winter active clover-based pastures, it is customary to apply superphosphate in the autumn at the start of the main growing season. This is the best time to apply superphosphate where soil phosphorus levels are low and immediate responses are expected. Timing is less critical where phosphorus soil test values are higher and maintenance dressings of superphosphate are being applied. In these situations, phosphorus can be applied in the autumn or spring.

In southern Australia, ground conditions may be too wet during winter to allow spreading operations at that time of year. Spring topdressings are often advocated on soils that have a high phosphorus fixing capacity and are prone to water logging during winter. Iron and manganese become more available in the soil in these circumstances and react with phosphate ions in solution to produce less soluble phosphorus compounds.

In addition to phosphorus and sulphur, molybdenum is often required in pasture on acid soils. Molybdenum (Mo) is required in minute or trace amounts and plays an important role in nitrogen fixation. The *Rhizobium* bacteria in the nodules on legume roots have a ten times higher requirement for molybdenum than the host plant. Molybdenum fortified grades of superphosphate are available for use on legume-based pasture, e.g. SuPerfect® Mo 0.025%.

SAFETY DIRECTIONS

Refer to the Safety Data Sheet (SDS) for more detailed safety advice. Before use, read the Product Label and the SDS. Use safe work practices and avoid contact with the eyes and skin. Avoid ingestion and inhaling dust. Protective clothing, eyewear and dust masks should always be used when dealing with this product. Observe good personal hygiene, including washing hands after use. Avoid loss of fertiliser to waterways.



WARNING

This document contains information of a general nature. Before using fertiliser seek independent agronomic advice. Fertiliser programs may need to be varied depending on the plants being grown, climatic and soil conditions, application methods, irrigation, agricultural and livestock management practices, the soil's fertility, and cultural practices. ('Unforeseen Elements')

Fertiliser may burn and/or damage crop roots or foliage. Foliar burn to the leaves, fruit or other plant parts is most likely to occur when fertilisers are foliar applied at high concentrations and/or on a regular basis, different products are mixed and sprayed together at cumulatively high rates, the water is of poor quality, or the spray is applied under hot dry conditions, e.g. in the heat of the day.

Fertiliser and supplements may affect animal health. Seek independent advice before using any supplements in livestock rations.

DISCLAIMER

As Unforeseen Elements are beyond the control of Incitec Pivot Limited, in no event Incitec Pivot Limited and its related bodies corporate be liable or accept any responsibility whatsoever for any direct, indirect, punitive, incidental, special or consequential damages (including but not limited to loss of revenue, crops and livestock), in respect of the illness, injury or death of a person, damage to property (including of a third party), or any other loss whatsoever arising out of or connected with the use or misuse of this fertiliser, or its transport, storage, handling or application. Where Incitec Pivot Limited and its related bodies corporate's liability cannot be lawfully excused, it and its related bodies corporate's liability shall be limited to the replacement of, or cost of the fertiliser supplied. The buyer accepts and uses this product subject to these conditions.

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