

The Wheel Track Roller™

“A practical solution to maximise water retention and mitigate surface water run-off for farmers who use tramlines”.



Soil and Water Management in Agriculture

All arable soils throughout the world experience varying degrees of water related problems, in particular with regard to maximising water retention (to the benefit of crop output and reducing the need for further watering) and hence minimising water run-off, reducing the adverse consequences of this on the environment.

As per "The Current Status of Soil and Water Management in England", published by the Royal Agricultural Society of England, "Agricultural production in general and soil and water management in particular, face a considerable challenge in meeting demands of i. increasing food production and security at both national and international level, ii. the demand for alternative fuels, iii. climate change, iv. soil protection, v. flood and pollution control and vi. the availability of water resources for crop and animal production combined with the diminishing supply of labour".

Soil is being eroded from the land by rainfall, often ending up as sediment in rivers to the detriment of their flow, increasing the threat of flooding (sediment being the primary contributor to the increase in occurrences of flooding from our waterways), increasing the likelihood of fertilisers and other potential pollutants being carried to other landowners and ultimately also into the water course.

Facts:

- 72% of the land in England is under agricultural management
- 99% of the world's food comes from the soil
- more than 10m hectares of crop land is lost each year as rain and wind erode topsoil
- 300m ha, enough to feed Europe and 10 times the size of the UK, has been so severely degraded it cannot produce food
- in many places, soil is being lost far faster than it can be naturally regenerated
- attempts to irrigate arid lands have produced soils so salty that nothing will grow
- farming has produced an 'agricultural scar' on the planet that affects one third of productive soils.

Solutions are available in the market for soil run-off issues on soft, un-compacted soils.

No solution is currently known to be available for medium / hard compacted soil.

DEFRA funded R&D shows that **tramline** (*) wheelings, compacting the soil, can **account for 80% of run-off**.

* Tramlines are of vital importance in the modern farming environment and are parallel lines in crops that allow farmers to drive through their fields to fertilise and spray accurately without causing damage to surrounding plants - <http://www.ukagriculture.com/crops/tramlines.cfm>

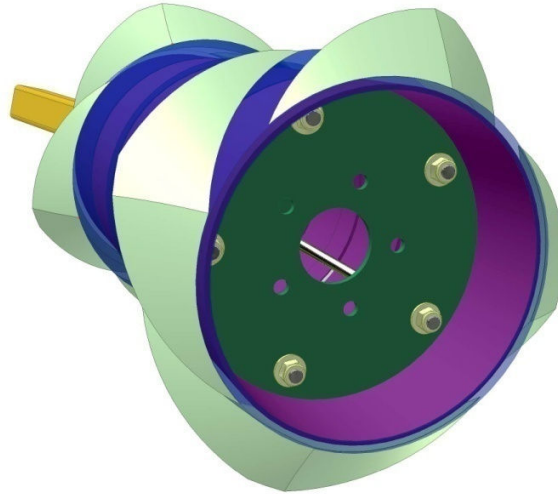
A solution is required that can indent the compacted soil and hence provide a reservoir to retain the water to prevent run-off.

A solution is required that can self-clean in order to facilitate continuous operation, even in demanding soil conditions.

A solution is required which furthermore directs the water retained into the soil which is going to support the crop, in order that the water can both soak away and also be of benefit to the crop in particular.

The Wheel Track Roller

Aquagronomy believe they have developed such a solution in their **Wheel Track Roller**.



The Wheel Track Roller reduces water run-off in crop tramlines by holding water in mini reservoirs.

Infiltration takes place down drainage channels directed under the adjoining crop.

The centre of the tramline remains compacted to maintain trafficability.

Benefits

Water is directed under the roots of the adjoining crop for potential uptake.

No disturbance of buried stones when stone and clod windrowing is practised.

No hindrance to future tramline traffic.

Self-cleaning moulded plastic Rollers enable the creation of evenly spaced indents / reservoirs.

Reduction in pollution potential / liabilities.

Reduction in soil erosion.

The Wheel Track Roller

Features

Machine adaptable for operation in combinable crops (cereals) AND ridge / bed grown crops (potatoes / vegetables).

A uniquely shaped self-cleaning, high-slip, low soil adherence plastic Roller forms angled elongated reservoirs.

The oblique angled Roller self cleans by the *slip and scour* movement.

A 100% longer indent than tooth length creates fissures in the soil surface to further aid absorption.

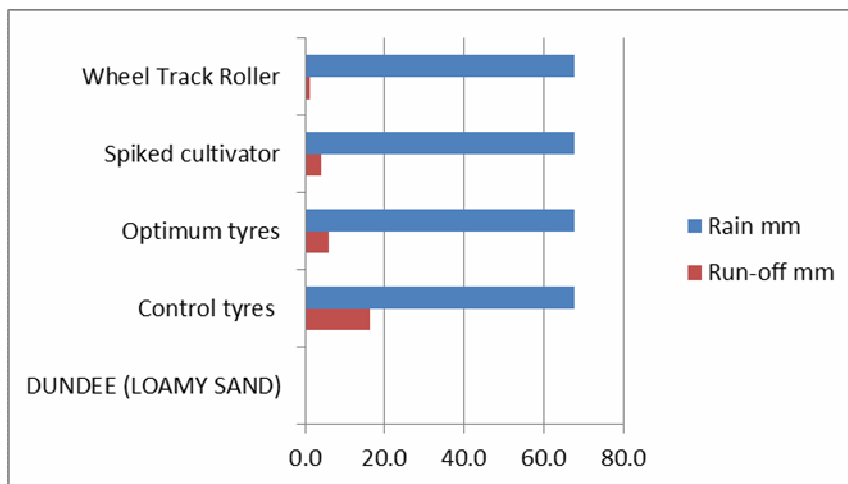
The concave shaped centre section of the Roller gives a necessary, compacted convex centre of the tramline pathway that ensures water flows into reservoirs to maintain a dry pathway that facilitates traffic.

Angled tines divert the water through the soil and into the crop.

The results

Significant and substantial reductions of surface water run-off.

In controlled trials conducted with well above average rainfall (68mm) and with exceptionally high soil moisture content, the **roller reduced rainfall lost as run off to a remarkable 1.9%, compared to 23.9%** otherwise.



Following 67.6mm of rainfall, 16.2mm of this (23.9%) “ran off” via “untreated” tramlines. Following the integration of the Wheel Track Roller, this run off amounted to just 1.3mm (1.9%).

The Wheel Track Roller – How It Works

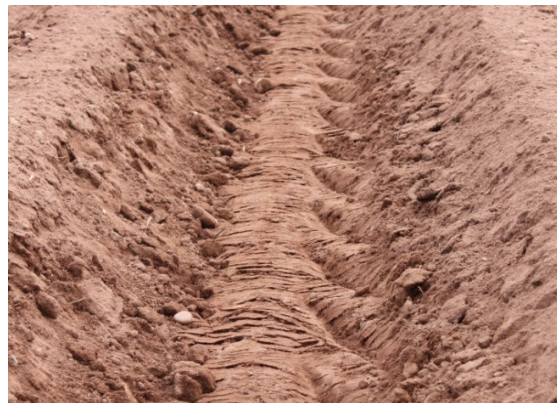
Available for use on typical and commonly available toolbars or with our tailor-made solutions, the roller works in conjunction with angled tines to provide a unique solution.



Tines run to the side of the compaction caused by the tractor, imparting minimal surface disturbance but generating a channel through which the surface water can escape into the adjoining crops.



The unique self-cleaning, high-slip, low soil adherence plastic Roller forms angled elongated reservoirs to hold the surface water and at the same time creates fissures which facilitate the dissipation of the water into the soil which remains soft around the channels generated by the tines!



The Wheel Track Roller – Background

Practical solutions have been found to mitigate the problem of run-off from deep tilled fine textured soil i.e. soil that has not been compacted.

One of these solutions, the Aqueel, was invented and patented by Charles Creyke, who has dedicated many years to soil management and most notably invented the de-stoning system now used by the majority of potato growers.

Inventing and developing the Aqueel highlighted the fact to Charles that a significant problem of run-off still remained along the compacted tramlines used by farmers to guide them as they sowed their crops or applied feeds / chemicals.

Charles therefore moved on to devoting his time to researching attempts made elsewhere and looking at solutions to similar but different problems / applications.

Initially he concocted a theory, then formulated a design and ultimately applied his engineering skills to produce his own scale model of a Roller for “bench-top” testing.

It is well known and understood within agriculture that the “tillage action required to create a desired soil condition is envisioned and then developed by trial and error” (Soil Dynamics in Tillage and Traction USDA No 316).

Once happy with the function of the design an international patent application was made, subsequent to which prototypes have been tested and refined and a new plastic formulation developed “in-house” to further enhance the self cleaning of the Roller, by promoting low soil adherence.

Working in conjunction with a consortia of industry and academia, through an ADAS-led Sustainable Arable LINK Programme 3386, backed by Government sponsors including Defra and The Environment Agency, the Roller has been “put through its paces” and the results to date have vindicated Charles’ commitment to his design and the materials.

Trials of the Roller continue, both in controlled environments and on working farms whilst being prepared for market.

Meanwhile, parties interested in testing the Roller are welcome to get in touch with Charles – contact details provided on the next page.

The Wheel Track Roller – Further Information

For further information

Contact Charles Creyke directly at:

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The Wheel Track Roller – Acknowledgements

Acknowledgements

The data shown in “results” has been provided courtesy of the ADAS led Sustainable Arable Link Project 3386 and Aquagronomy Limited would like to acknowledge the part that this Project has played in the refinement and evaluation of the Roller.

Project 3386 addresses the need for practical affordable and targeted management of fields with combinable crops to help reduce the risk of losses of soil, phosphorus and nitrogen from land to water courses to support sustainable farming and WFD catchment management.

The main benefit of the project is the development, testing, evaluation, refinement and demonstration of practical engineering solutions for tramline management which are both cost-effective and fully compatible with agri-environmental policy tools such as Defra’s Environmental Stewardship scheme.

Inclusion of the most effective techniques in agri-environment schemes would encourage uptake and offset any implementation costs.

Sustainable Arable Link Project 3386 is supported by the following organisations:



The Roller is also being evaluated in a MOPS2 Project, again funded by Defra, led by ADAS with support from The Potato Council and Briggs Irrigation. Albeit results have yet to be published they show a substantial alleviation of soil compaction, improved filtration and reduced run-off. Impact on crop yields are still to be measured, following harvest.



For more details of these Projects please contact:

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