

A large and low cost rain-out shelter design

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The success of drought studies in the field is often dependent on excluding rainfall at critical stages of crop development. Current designs can be divided into two categories; a) small portable designs which although inexpensive to construct, need to be moved manually and are limited by their small sampling area, and b) large permanently positioned designs which allow more realistic plot sizes, but are prohibitively expensive for routine agronomic research. In this paper we describe a large, retractable, low cost and relocatable rain—out shelter design which overcomes many of the limitations of other designs.

Design and construction

The rain-out shelter consists of a waterproof vinyl sheet which is supported and extended along seven steel (8mm cattlestrand) cables (Fig. 1). The sheet is suspended from 40mm ceramic electric fence insulators threaded onto the cables, which allow the sheet to be drawn along the cables with very little resistance. The cables are spaced evenly on triangular end assemblies made from RHS steel, and pass 7m past to a central anchor point. We have used several anchorage systems including large plough discs, railway sleepers and electricity commission stay poles, and have found the latter to be the most effective. A 12 volt starter motor, made reversible by rewiring with solenoids, provides motive power to drive an endless rope (located above the end assemblies) which extends or retracts the vinyl cover. Further development to fully automate extension and retraction of the sheet using FM radio transmitters and/or a rain sensing device is currently underway.

Our current design can effectively cover a 25m long by 6.5m wide plot area. The problem of rain—out shelter influence on the surrounding aerial crop environment is minimised with our design because the retractable cover compacts to less than 1.0m, and the cables and end assemblies cast negligible shadows onto the plot. The low cost of the shelter (approx 58,000) compared to fixed conventional types (upwards of 550,000) means several shelters can be operated to achieve proper replication in space.

This design is currently covered by a provisional patent (application no. PI 7141), and is being manufactured by Mr. I. Grevis-James, Rimik Pty Ltd, Rutledge St. Toowoomba Q 4350 (076 381 586).

Figure 1. Rainout Shelter Design



