SOLEX

GARFORD FARM MACHINERY

Robocrop InRow

Complete inter-row and inter-plant weed control!

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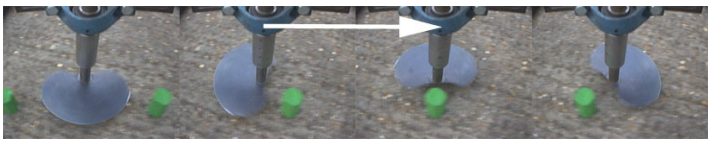
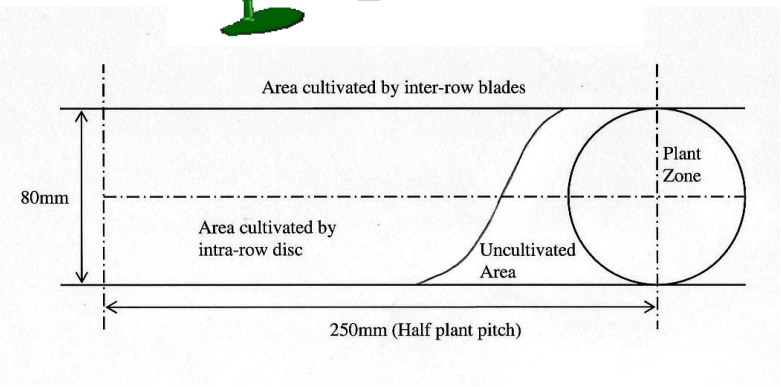
Robocrop InRow *mechanically controls weeds growing between plants within rows of transplanted salads and leafy vegetables.*

Overview: Robocrop Inrow is based upon the same type of technology as the successful and well proven Robocrop inter-row precision guidance system. Robocrop InRow uses a digital video camera to capture images of the crop ahead of the toolbar. These images are processed at a rate of 25 frames per second to find the positions of the individual plants as they pass through the image. This information is then utilised for lateral steering of the hoe and individual synchronisation of the InRow weeder discs.

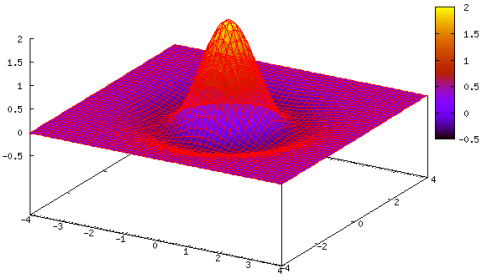


The Inter-row and InRow Implement: Based on a standard Robocrop vision guided inter-row hoe lateral row following is maintained accurately to within 10mm via steered soil engaging discs. The InRow weeder discs are attached to a depth wheel unit mounted on the implement so that cultivation depth is consistently maintained.

Mechanical Design: The InRow weeder system is based on a disc rotating about an axis and set to cultivate at a shallow depth (typically 20mm) within the crop row. The crescent shaped disc profile is designed to arc around the plants and then cut in between the plants as it rotates around the axis. Rotation of the disc is synchronised with forward movement and the plant positional information from the imaging camera.
Disc profile and synchronisation setup is a compromise between maximising cultivated area and providing adequate tolerance to plant misalignment, in order to prevent any crop damage. The tolerance required depends on the growth habit of the crop plants. For crops with regular growth habits the uncultivated area can be reduced to almost zero. 80mm diameter uncultivated plant zone is common.



Plant Detection Using Computer Vision: An algorithm based on two dimensional wavelets locates individual crop plants. These wavelets provide a spatially localised means of extracting a periodic planting pattern based on individual plants and their near neighbours. Initial placement of the Mexican hat wavelets is based on predicted plant position from a Kalman filter tracking algorithm. An adaptive step size hill climbing technique positions the Mexican hat over individual plants which are tracked by the Kalman filter as they proceed down subsequent images. Any error between tracked plant position and disc cut out is corrected via a proportional valve controlling a hydraulic motor that drives the cultivating disc.



Performance: Generally a performance of 2 plants per second per row is achievable eg. A 3mtr wide system in plant spacing of 47cm would achieve spot workrate of over 1ha per hour.
The percentage of cultivated area is generally better than 95%.

Untreated Treated