COVERTAN

Application sheet: C024 Growth Enhancement due to fleece

Crop Cover enhancement of photosynthetic activity and microclimate

Micro-climate & Photosynthesis

Plants grow in a micro-climate that is a function of many factors including location, sunlight, rainfall and soil . This micro-climate dictates the growth process of the crops.

Fleece crop cover such as Covrtan can manage and enhance this, resulting in a better growth environment and better yields.

Temperature around the plant, key in optimising the growth environment, is a function of two elements — solar heating and terrestrial radiation.

1. Solar heat warms the entire soil/plant/atmosphere system.
2. Terrestrial radiation emits from warm soil, resulting in a loss in ground temperature which has a negative impact on plant root development.

Solar and terrestrial radiation are at their maximum under clear skies. Cloudy sky causes both forms of radiations to be attenuated.

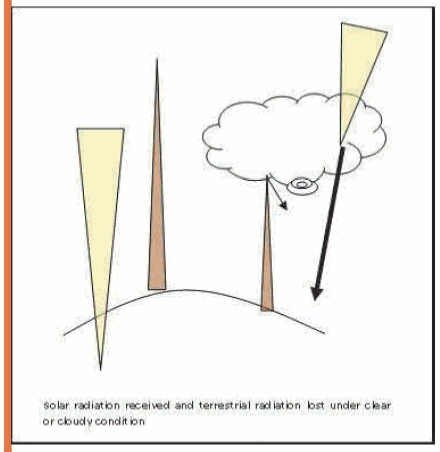
The use of fleece between the plant and the atmosphere allows good solar radiation transmission but decreases the terrestrial energy loss, producing a greenhouse effect. This improves the overall thermal balance.

Correct grades of fleece maintain good transmission of solar radiation to reach both the plant and soil, but provide a local barrier to terrestrial radiation, retaining the warmth around the plant for good growth.

Correctly selected fleece transmits 80-90% of the solar radiation when first applied, but this can be reduced by various factors:

Age of the sheet	reduction of 25-30%
User conditions (soil throw, deposit of dust)	reduction of 20-25%
Double sheeting	reduction of 35%

This can be a limiting factor for crop growth. Appropriate strategies for re-use and replacement should form part of the planning for best economic yields. Clearly the degree of temperature retention is impacted by location, however gains of 3.5°C on average are typical with instances of up to 10°C recorded for Covertan 17 during the winter of 2012/13 (day temperature)



Solar radiation received and terrestrial radiation lost under clear or cloudy condition

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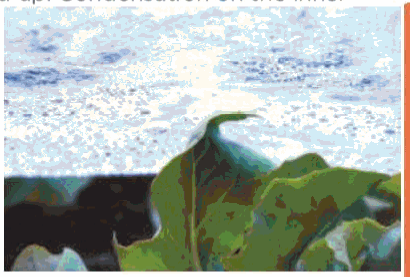
Impact on the photosynthetic activity and microclimate

Air renewal / Permeability / Water and Carbon cycles

Unlike plastic films, fleece is a porous, breathable materials that ensures continuous air renewal and moisture transmission. Acting as a wind break, fleece reduces the evapotranspiration (ETP) which improves photosynthesis and plant growth (higher relative humidity). ETP under fleece is comparable to that in a greenhouse.

Evapotranspiration produces a saturated vapour atmosphere under in the covered area. The vapour condenses on the inner face of the cover where a portion re-evaporates, and the remainder is returned to the soil, which ensures an optimum use of water.

At night, the fleece cools which promotes condensation build up. Condensation on the inner face of the fleece forms a water film which blocks the long-wave infrared and enhances the thermal effect.



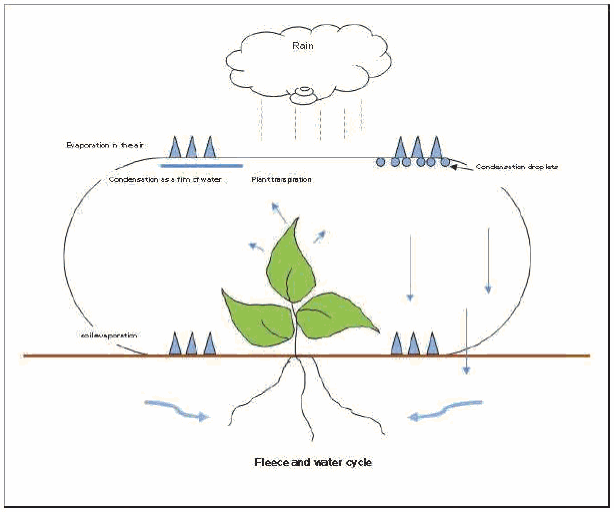
At day, the water vaporises in the atmosphere or condenses, depending on weather conditions (cloudy or not).

The greenhouse effect is greatest with a film of water across the fleece and at a minimum when the fleece is dry.

During the night, the fleece retains the Carbon Dioxide (CO_2) emitted by the soil which increases photosynthesis at daybreak, as chlorophyll assimilation is improved.

Studies on early carrots (Ctifl Balandran, Serfel, 1982) show that fleece can increase yields up to 97 % compared to uncovered control .

	Control	Covertan 17
Number of saleable roots per linear meter	50.8	66.7
Weight of saleable roots per linear meter	2.1	4.1
Yield/ha	38t	75t



Fleece and water cycle

Literature

Gerst, J. -J., 1987. Growing vegetables crops under direct covers. Ctifl, Paris, 165P.

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