

Thesis Title

Response of roselle to water deficit at
the early growth stage

Author

Mrs. Taksina Sansayawichai

Thesis Advisory Committee

Viriya Limpinuntana

..... Chairman

(Dr. Viriya Limpinuntana)

N. Vorasoot

.....

(Associate Professor Dr. Nimitr Vorasoot)

Amnuaysilpa Suksri

.....

(Assistant Professor Dr. Amnuaysilpa Suksri)

ABSTRACT

The purpose of the experiments were to investigate the effect of water deficit at early growth stages on growth and yield of three roselle cultivars and to study the ability of one cultivar to tolerate and recover from water deficit. The experiments were performed in Khon Kaen, Thailand.

The first experiment was conducted in the field with a Korat soil from 24 March to 22 October 1986. The

experimental design was a split plot with 4 replications. The main plots consisted of 3 water deficits and a continuously irrigated treatment. Water deficits were imposed on roselle during 3 - 6 weeks, 6 - 9 weeks and 9 - 12 weeks after planting. The sub-plots included three roselle cultivars; Khiew Yai, Non Soong 2 and Toan Daeng. It was found that the method of inducing water deficit by covering the soil surface with a plastic sheet was highly effective only at the period of 3 to 6 weeks after planting. Water deficit at 3 to 6 weeks after planting retarded growth of roselle. When the stress was removed plant growth was recovered by increasing leaf area so that there was no difference in total dry matter among all treatments. Fiber yields from all treatments were similar and ranged from 3,716 to 3,975 kg/ha, when harvested at 205 days after planting.

The second experiment was performed in a greenhouse using pot technique from 14 July to 3 November 1986. A 3x4 factorial in randomized complete block design was employed with 3 replications. The two factors consisted of 4 water supply treatments, 3 roselle cultivars similar to those in the first experiment. Soil water content in the water deficit treatments was kept at 25% of the level of field capacity. The results showed that all 3-weeks water deficit treatments reduced growth of 3 roselle cultivars by retarding the increases in height, reducing leaf area and increasing leaf senescence. After rewatering the roselle increased growth by increasing height and leaf area due to expansion of young leaves and prolonged duration of mature

leaves. Water deficit at 9 - 12 weeks after planting caused roselle to produce lowest dry matter. Withholding water at 3 - 6 weeks reduced plant growth stronger than that at 6 - 9 weeks after planting. Water deficit at 3 - 6 weeks increased the root - shoot ratio of roselle. All 3 roselle cultivars responded similarly to water deficit treatments.

The third experiment was conducted in the greenhouse during 6 April to 16 August 1986. A completely randomized design with 4 replications was employed in the pot experiment using one roselle cultivar (Non Soong 2). Ten treatments consisted of 8 water deficits and 2 continuously irrigated treatments with one kept as a control and another having planting date 30 days later than the other. Water deficit treatments included withholding water between 0 to 10, 0 to 20, 0 to 30, 0 to 45, 20 to 30, 20 to 40, 20 to 50, and 20 to 65 days after planting. It was found that roselle leaves wilted when the soil moisture was below the level of permanent wilting point. Roselle was able to withstand the wilting condition for 18 days but died when the wilting was prolonged to 25 days. The surviving plants were able to resume growth after rewatering by increasing height and leaf area. Reduction in dry matter yields depended on crop growth periods when a water deficit was imposed and also the duration of deficit. Although leaf area lost more than 50%, roselle from a strong water deficit treatment produced similar dry matter yield to that from the late planting at harvesting time (16 August).