

Role of thiourea in improving productivity of soybean

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SUMMARY

Lowered photosynthetic rate, poor transport and partitioning of total dry matter to grain decreases yield of soybean (*Glycine max* L.). Dry matter accumulation can be enhanced *via* delaying senescence and improving photosynthetic efficiency. Foliar spray of thiourea can be used as a tool to improve photosynthetic efficiency and partitioning of assimilates. Thiourea treatment (2000 ppm) significantly increased chlorophyll contents, shoot-root dry matter and weight per 100 seeds at V₂, V₆, and R₂ stages.

Key words : Chlorophyll contents, Dry matter, Weight per 100 seeds, Thiourea, *Glycine max* L.

Yield is the product of total dry matter accumulated and allocation of these assimilates in to economically important components such as fruit or seed (Kumudini *et al.*, 2002). Poor transport and partitioning of dry matter to grain can cause reduction in yield (Cregan and Yaklich, 1986 and Webrer, 1966). The production of dry matter is dependent on the plants ability to capture radiant energy from the sun through the process of photosynthesis i.e. yield can be determined by increase in photosynthetic efficiency. Dry matter accumulation can be enhanced *via* increasing duration of life cycle delaying senescence or increasing the efficiency by which plant converts solar radiation in to dry matter (Shiraiwa and Hashikawa 1995). Sahu *et al.* (1995) reported that foliar spray of thiourea significantly increased growth and yield in maize, most probably *via* improvement of photosynthetic efficiency and canopy photosynthesis. Singh and Rathore (2003) also observed that thiourea significantly increased yield in greengram. Singh and Singh (2002) found that nitrogen and sulphur nutrition increase the yield of rice (*Oryza sativa* L.). In *Brassica campestris* L. increase in photosynthetic rate and yield was observed by Kaur and Jagetiya (2003). Maximum increase in photosynthetic rate and yield was observed when treatment was given at flower initiation stage. Very little is known about the effect of thiourea on soybean and remobilization of assimilates into the grains. Keeping above in the view present investigation was undertaken to know the role of different concentration of thiourea on photosynthetic efficiency in terms of chlorophyll contents, shoot and root dry matter and partitioning of assimilates in terms of yield (weight per 100 seeds).

MATERIALS AND METHODS

The experiment was conducted to find out the effect of foliar spray of different concentration of thiourea on growth parameters of soybean. Certified seeds of soybean were surface sterilized with 0.1% (W/V) HgCl₂ for one minute and washed well in running water. Water soaked seeds were then sown in the first week of August in earthen pots (30cm height an 18cm diameter) containing 5 kilograms

garden soil. The pots were placed in such a manner that all the plant parts could intercept light. Watering was done at regular intervals. Different concentrations of thiourea (1000, 1500 and 2000 ppm) were sprayed at V₂, V₆, R₂ and R₈ stages. Three replicates were used for each treatment. Leaf samples were collected after 4 days of foliar treatment for biochemical analysis at each stage. Yield (weight per 100 seeds) was estimated after pod maturation.

RESULTS AND DISCUSSION

Lowered photosynthetic rate, poor transport and partitioning of total dry matter to grains decreases the soybean yield. Some other factors *i.e.* structural complexity of leaf also can restrict transport of assimilate. Foliar spray of some chemical can be used as tool in improving photosynthetic efficiency and partitioning. In maize it is observed that thiourea-overcome restriction which are barriers in assimilate transport leading to an increase in growth. Thiourea also increases chlorophyll contents in leaves. In henna (*Lawsonia inermis* L.) Khandelwal *et al.*, (2002) found maximum weight of flowers, essential oil content in flowers and yield of essential with 2000-ppm thiourea. Sritonip *et al.*, (2005) observed that thiourea treatment increased flower emergence and CO₂ assimilation in 'Do' Longan. Burman *et al.*, (2004) studied that thiourea enhanced net photosynthesis, leaf area, chlorophyll and nitrogen metabolism leading to significant improvement in plant growth and seed yield under water stress condition.

Foliar treatment of thiourea increased chlorophyll contents at V₂, V₆ and R₂ stages. Much pronounced effect on chlorophyll content was found at 2000-ppm thiourea treatment at all the growth stages. The percentage increase in chl. a, chl. b and total chlorophyll for V₂, V₆, R₂ and R₈ stages were 12.64%, 13.58%, 6.42%, 16.21%, 20.51%, 19.56%; 25.15%, 30.83%, 24.92% and 3.06%, 7.14%, 1.94% with 2000 ppm thiourea treatment, respectively. Thiourea a sulphhydryl compound is mainly the source nitrogen and sulphur. The sulphur deficiency is similar to nitrogen deficiency and it is explained by this fact that nitrogen is constituent of chlorophyll molecule and sulphur is not a constituent of chlorophyll but both are essential for

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