

Response of summer sesame (*Sesamum indicum*) to irrigation and nitrogen in calcareous soil

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Received: April 1992

Sesame (*Sesamum indicum* L.) has been recently introduced as summer crop in north Bihar. Therefore its agronomic parameters are required to be standardized for realizing its full yield potential. Keeping this in view, a field experiment with 5 irrigations and 4 nitrogen levels (Table 1) was conducted during summer 1990 at Pusa.

The experiment was conducted in randomized block design with 3 replications. The soil was sandy loam with pH 8.5 and free CaCO_3 25.4%. The soil had organic carbon 0.43%, P_2O_5 11.9 kg and K_2O 109 kg/ha. The field capacity and permanent wilting point were 21.5 and 8.2 in 0-30 cm soil layer respectively, whereas bulk density in the same layer was 1.45 g/cc. The experiment was sown on 21 February 1990 and harvested on 5 June 1990. Entire N was applied at sowing as per treatment. A depth of 6 cm was applied in each irrigation. The water-table depth was always below 4 m and therefore did not contribute in water supply to root zone.

The maximum yield was recorded at an irrigation water depth : cumulative pan evaporation (IW : CPE) ratio of 0.7 with 3 irrigations, followed by 2 irrigations at 30 and 60 days after sowing (Table 1). The results confirm the findings of Ghosh and Biswas (1984) and Rai *et al.* (1984). Higher yield with 3 irrigations was due to proper moisture in the root zone which helped in

translocation of nutrients as well as maintenance of proper hydration for proper functioning of biochemical reactions. Like irrigation, N also favourably influenced sesame yield. The maximum seed yield was recorded at 90 kg N/ha and each successive increase in N over no N resulted in significant increase in yield. The yield in general was low due to high pH and high CaCO_3 in soil.

Response to irrigation ($Y = 1.019 + 0.063X$) and nitrogen ($Y = 1.32 + 0.01 X$) was linear.

The highest oil content in seed was observed at an IW : CPW ratio of 0.5 (46.03), being on a par with similar number of irrigation 30 and 60 days after sowing (46.01%) and significantly higher than no irrigation and other soil-moisture regimes. The highest oil content was obtained at 30 kg N/ha compared with no N and higher levels of 60 and 90 kg N/ha.

Number of capsules/plant, number of seeds/capsule and 1,000-seed weight increased significantly up to 3 irrigations. Number of capsules/plant and 1,000-grain weight increased up to 30 kg N/ha, whereas number of seeds/capsule increased up to 90 kg N/ha.

In the present investigation, 3 irrigations based on IW : CPE ratio of 0.7 were economically superior to all other irrigation levels (Table 1). The highest net income was recorded up to 90 kg/ha, however it was on

par with 60 kg N/ha.

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Indian J. Agron. 38 (1) : 147-149 (March 1993)

Effect of humic acid on sesame (*Sesamum indicum*) growth and yield under two nitrogen levels

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Received: June 1991

Organic matter plays a prominent role in sustained productivity in tropical soils under continuous cultivations. Organic sources for incorporation into the soil are becoming scarce. Hence as an alternative, humic acid extracted from lignite in accordance with the procedure of Stevenson (1965), was tried to find out this effect on irrigated 'CO 1' sesame (*Sesamum indicum* L.).

A field experiment was conducted in a farmer's field during June-October 1989. The soil was sandy loam with pH 8.0, electrical conductivity 0.24 dS/m, organic carbon 0.38%, cation-exchange capacity 3.6 cmol (P⁺)/kg, and was low in available N and K and medium in available P. The experiment was laid out in randomized block design with 10 treatments (Table 1) with 3 replications. Recommended doses of P₂O₅ and K₂O each @ 22.5 kg/ha as superphosphate and muriate of potash, and

MnSO₄ @ 5 kg/ha were applied basal to all plots. N @ 35 kg/ha as urea was applied to the respective plots.

Lignite humic acid contained 58.3, 5.22, 32.3 and 1.22% respectively C, H, O and N, and 3.12 and 1.28 meq/g carboxyl and phenolic OH groups. Humic acid in soluble form as K-humate solution of pH around 7.09 was sprayed on the soil surface in the respective plots. Sesame seeds of 'CO 1' (85 days duration) were sown and a uniform population of 11 plants/m² was maintained in all the plots. Plant height, dry-matter production, capsules/plant, 1,000-seed weight and sesame yield were recorded.

The plant height at harvest and dry matter at different stages of sesame were increased with the combined application of N @ 35 kg N/ha and humic acid @ 20 kg/ha. Daulay and Singh (1983) made similar observation in sesame with reference to N application.