

NITROGEN ECONOMY THROUGH BIO-FERTILIZER IN SUNFLOWER (*HELIANTHUS ANNUUS L.*)

Mahendra Singh PAL¹

¹ *G B Pant University Of Agriculture & Technology, Pantnagar (Uttarakhand), India*

drmspal1@gmail.com

ABSTRACT

Field experiment was carried out at G B Pant University of Agriculture & Technology, Pantnagar (India) during spring season of 2013 and 2014 to study the response of biofertilizers on productivity, profitability and nitrogen economy of sunflower in Indo-Gangetic plains of India. The experimental site was loamy in texture with 0.625% organic carbon, 269, 24.6 and 227 kg/ha available nitrogen, phosphorus and potassium, respectively and neutral in soil reaction with 6.85 soil pH. The experiment was laid out in completely randomized block design with 11 treatments i.e. No N (T1), 50% N (T2), 100% N (T3), *Azospirillum* (*Azos*) seed treatment (T4), *Azotobacter* (*Azot*) seed treatment (T5), *Azos*+*Azot* seed treatment (T6), 50% N+*Azos* seed treatment (T7), 50% N *Azot* seed treatment (T8), 50% N+*Azos*+*Azot* seed treatment (T9), 100% N+*Azos*+*Azot* seed treatment (T10) and 75% N + *Azos*+*Azot* seed treatment (T11) in three replication during spring season (February to May). The recommended dose of fertilizers were 120, 60 and 40 kg/ha nitrogen (N), phosphorus (P205) and potassium (K20), respectively. The nitrogen was applied as per treatments including 50% at sowing and 50% at budding stage but total P and K were applied at the sowing time. The crop was grown under recommended agronomy except the treatment variations. The growth and yield attributes, seed yield and yield reduction over 100% N at harvest were affected significantly by bio fertilizer application. The sunflower seed yield was recorded significantly highest at 100% N+ seed treatment with *Azot*+*Azos* and was significantly similar to 100% N application during both years and average value was only 4% greater than 100% N application. The seed treatment with *Azot* was found better than *Azos* with 6.7% higher average seed yield. Similarly the combined treatment with *Azot*+*Azos* gave 6.2% higher seed yield than seed treatment with only *Azot*. The seed yield was increased when N application was combined with seed treatment either of *Azot* and *Azos* or both. The average seed yield under 100% N+ seed treatment with *Azos*+*Azot* gave 6.8 and 2.4% higher yield than 100% N during 2013 and 2014, respectively. The seed yield at 75% N+seed treatment with *Azos*+*Azot* was recorded significantly equal to 100% N and 100% N+seed treatment with *Azos*+*Azot* in 2013 but was significantly lower in 2014. However the average seed yield under 75% N + seed treatment with *Azos*+*Azot* was 7.4 and 11.0% lower than 100%N and 100% N+seed treatment with *Azot*+*Azot*. The biofertilizers did not influence the oil content. The gross, net returns and B:C ratio were found significantly higher at 100% N+seed treatment of *Azos*+*Azot* but remained significantly equal to 100% N during both years. Similarly the average gross, net returns and B:C ratio were found almost equal at both 100% N and 75% N+ seed treatment with *Azos* + *Azot*. It is therefore recommended that 25% N can be saved with seed treatment with *Azotobacter* only. Hence, 75% N+seed treatment with *Azotobacter* may be recommended for higher productivity, profitability and N economy of sunflower production in Indo-Gangetic plains of India.

Key Words : *Azotobacter*, *Azospirillum*, Bio fertilizer, Nitrogen economy, Indo-Gangetic plains