

Short Communication

LAI and PAR interception in maize as influenced by fertilizer management in Punjab

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Maize (*Zea mays* L.) is one of the most versatile cereal crops and widely cultivated in more than 150 countries of the world including tropical and temperate regions. Though maize can be grown in the wide range of climatic conditions, its productivity is largely depending on the prevailing weather conditions throughout the life cycle of the crop. Different management practices as well as prevailing weather parameters affect growth and development of crop differently. Therefore, it was contemplated to have an insight on the effect of photosynthetically active radiation (PAR) interception and leaf area index of maize grown under different nutrient management practices in Punjab.

The field experiment was conducted during the *kharif* season of 2015 and 2016 at Student's Research Farm, Department of Agronomy, Punjab Agricultural University, Ludhiana (30°54'N; 74°48'E and 247m above m. s. l.). The experiment was carried out in randomized block design keeping four replications and seven treatments (i) 50 % recommended NPK + 50 % N as FYM, different organic sources each equivalent (ii) 1/3 of recommended N (FYM + vermi-compost + castor cake), (iii) 1/3 of recommended N (FYM + vermi-compost + castor cake) + intercropping (Soybean), (iv) 1/3 of recommended N (FYM + vermi-compost + castor cake) + agronomic practices from weed control (sowing of cowpea between the rows of maize and harvested at 35 DAS), (v) 50 % N as FYM + bio-fertilizer for N + rock phosphate to substitute the P requirement of crops + phosphate solubilizing bacterial cultures (PSB), (vi) different organic sources each equivalent to 1/3 of recommended N (FYM + vermi-compost + castor cake) + Bio-fertilizer containing N and P carriers and (vii) 100 % recommended NPK. Data were statistically analyzed by using CPCS1 software developed by the Department of Mathematics and Statistics, Punjab Agricultural University, Ludhiana. The daily meteorological data was collected from School of Climate Change and Agricultural Meteorology, Punjab Agricultural University, Ludhiana, Punjab. Periodic leaf area index (LAI) and photosynthetic active radiation (PAR)

interception were recorded at 30, 45, 60, 75, and 90 days after planting by using the Sun Scan Canopy Analyzer.

The maximum PAR interception was observed at 60 DAP due to highest value of LAI at this stage and gradually decreased in PAR interception due to senescence of leaf after this point of growth stage. Application of 50% N through FYM along with 50% N through inorganic fertilizers recorded higher photo synthetically active radiation interception as compared to other treatments but it is statistically at par with 1/3 N FYM + 1/3 N vermi-compost + 1/3 N castor cake + bio-fertilizer containing N and P carriers and 1/3 N FYM + 1/3 N vermi-compost + 1/3 N non edible oil cake at all growth stages of the crop. Application of 1/3 N FYM + 1/3 N vermi-compost + 1/3 N castor cake + bio-fertilizer containing N and P carriers recorded statistically higher PAR interception as compared to 100 % NPK, 1/3 N FYM + 1/3 N vermi-compost + 1/3 N castor cake + intercropping (Soybean) and 50% N as FYM + bio-fertilizer + rock phosphate + PSB treatment but was at par with 1/3 N FYM + 1/3 N vermi-compost + 1/3 N castor cake at all growth stages and this was due to higher plant height and leaf area index resulted more light interception by crop plants. Leaf area index is an important index which influences the photosynthetic efficiency of plant and has marked influence on plant growth and yield of crop. Maximum leaf area index in maize was recorded at 60 DAP. Leaf area index recorded during both the years was significantly higher in 50 % N through FYM + 50 % N through inorganic fertilizers which was at par with 1/3 N FYM + 1/3 N vermi-compost + 1/3 N castor cake + Bio-fertilizer containing N and P carriers at all intervals during both the years. At 30, 45 and 60 DAP treatment 1/3 N FYM + 1/3 N vermi-compost + 1/3 N castor cake was at par with treatment 50% recommended NPK + 50% N as FYM however minimum leaf area index was recorded with application of 50 % N as FYM + bio-fertilizer + rock phosphate + PSB treatment. Application of 1/3 N FYM + 1/3 N vermi-compost + 1/3 N castor cake + bio-fertilizer containing N and P carriers recorded significantly

Table 1: Effect of different source of nutrient on PAR interception (%) and Leaf Area Index (LAI) of maize

| Treatments | PAR interception (%) | | | | | Leaf area index (LAI) | | | | |
|--|----------------------|-----------|-----------|-----------|-----------|-----------------------|-----------|-----------|-----------|-----------|
| | 30 DAP | 45 DAP | 60 DAP | 75 DAP | 90 DAP | 30 DAP | 45 DAP | 60 DAP | 75 DAP | 90 DAP |
| 50 % recommended NPK + 50 % N as FYM | 44.4 | 57.6 | 83.5 | 75.8 | 67.4 | 1.2 | 2.1 | 3.9 | 3.6 | 3.2 |
| 1/3 N FYM + 1/3 N vermi-compost + 1/3 N castor cake | 41.2 | 53.3 | 81.5 | 72.7 | 64.5 | 1.2 | 2.0 | 3.6 | 3.3 | 2.9 |
| 1/3 N FYM + 1/3 N vermi-compost + 1/3 N castor cake + intercropping (Soybean) | 38.4 | 51.9 | 80.4 | 71.5 | 63.7 | 1.2 | 1.8 | 3.4 | 3.1 | 2.8 |
| 1/3 N FYM + 1/3 N vermi-compost + 1/3 N castor cake + agronomic practices from weed control | 38.6 | 52.3 | 81.1 | 71.8 | 64.2 | 1.2 | 1.9 | 3.5 | 3.1 | 2.8 |
| 50% N as FYM+ bio-fertilizer + rock phosphate + PSB | 34.3 | 50.6 | 78.3 | 70.6 | 61.3 | 1.1 | 1.7 | 3.4 | 3.0 | 2.6 |
| 1/3 N FYM + 1/3 N vermi-compost + 1/3 N castor cake + bio-fertilizer containing N and P carriers | 41.6 | 57.3 | 83.2 | 75.5 | 67.0 | 1.2 | 2.1 | 3.9 | 3.5 | 3.2 |
| 100 % NPK | 35.0 | 51.9 | 79.9 | 71.0 | 63.3 | 1.1 | 1.7 | 3.4 | 3.0 | 2.7 |
| CD (0.05) | 3.3 | 3.3 | 2.0 | 3.0 | 2.9 | 0.05 | 0.2 | 0.3 | 0.2 | 0.2 |

better LAI as compared to 50 % N as FYM + bio-fertilizer + rock phosphate + PSB but was at par with treatment 1/3 N FYM + 1/3 N vermi-compost + 1/3 N castor cake at 30, 45 and 60 DAP. Organic treatment 1/3 N FYM + 1/3 N vermi-compost + 1/3 N castor cake + bio-fertilizer containing N and P carriers recorded significantly better LAI as compared to chemical treatment. This increase in organic and integrated treatments, results in greater cell size, leaf thickness, leaf area and leaf number (Holmes, 1980 and Prasad *et al* 1990).

The result of present study leads to the inference that application of 50 % N through FYM along with 50% N through inorganic fertilizers recorded higher PAR interception and leaf area index (LAI) as compared to other treatments. Singh *et al* (2017) also reported that the PAR interception in baby corn was significantly influenced by the fertilizer treatments.

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