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Biomass and biogas yield of maize as affected by nitrogen rates with varying harvesting under semi-arid condition of Pakistan

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Maize is an indispensable crop cultivated globally, being C4 crop it is more photo synthetically active grown for food, animal feed and for bio-energy production. The present study was designed to investigate the effect of nitrogen rates (NR) and harvesting time (HT) on biomass, chemical composition and biogas production of maize grown under semi-arid condition of Pakistan. Results revealed that early harvesting decreased leaf area per plant as maximum value was found at 65 DAS followed by 55 DAS while lowest was produced at 45DAS. Among NR, higher level of N application of 200 kg ha-1 significantly enhanced leaf area per plant. The maximum chlorophyll contents (33.61%) were recorded at 45 DAS that was comparable with 55 DAS while the lowest chlorophyll contents (31.85%) were recorded at 65 DAS. Among NR, highest chlorophyll contents (35.02%) were observed when N was used @ 200 kg ha-1 that was similar 150 per ha, whilst lowest chlorophyll contents (29.13%) by no N application. The delayed HT significantly enhanced biomass yield while lower yields were produced by early harvestings. Among NR highest biomass yield was obtained with N applied @ 200 kg ha^{-1} that was same with 150 kg ha-1 whereas the lowest biomass yield was obtained when no N was applied. Regarding chemical composition, delayed harvesting clearly increased acid detergent fibers (ADF) and neutral detergent fiber (NDF). Regarding NR maximum ADF and NDF contents were recorded by applying higher N rates. In addition, advancing harvest time markedly enhanced protein contents of maize. Higher nitrogen application increased protein contents (11.84%) as highest value of protein contents was produced. With respect to biogas yield, advancing harvesting time increased the biogas yield while delayed harvesting clearly decreased the biogas yield of maize. NR rates also showed clear difference for biogas productivity as medium level application of N produced the maximum biogas as compared to other level tested in experiments.

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