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Abstract: At national level, total demand of green fodder in 2010 was 1057 million tonnes whereas, supply was only 395.2 million tonnes i.e. 62.63% deficit. Situation of Jharkhand in terms of animal population and fodder availability is on same footing of eastern region where the problem is much aggravated. In the state, livestock population is only 3.2 per cent being reared on 0.12 per cent of area under fodder production and on 0.95 per cent of grazing land. Quality of fodder is also important but open grazing produces poor quality forage which leads to malnutrition and hidden hunger in animal. Inclusion of oat in rice-fallow system utilizing natural resources is a viable option to supply quality forage particularly during lean period. With this backdrops a field experiment was carried out during 2010-11 and 2011-12 to study the effect of tillage and nutrient management on forage oat (var. Kent) and its residual effect on rice (var. Lalat) grown in the system. Soil of the experimental site was sandy loam in texture with acidic in reaction (pH 6.2), low in organic carbon (3.81 g kg-1), available nitrogen (232.0 kg ha-1), phosphorus (23.25 kg P2O5 ha-1), medium in available potassium (153.41 K2O kg ha-1), Ca (151.4 mg kg-1), Fe (55 mg kg-1), zinc (1.13 mg kg-1) and B (0.65 mg kg-1). The experiment was laid out in Split-plot design with three tillage management viz. zero tillage, minimal tillage and conventional tillage in main plot and four nutrient management viz. 125, 100, 75 per cent of recommended dose of fertilizers (RDF) and 75% RDF + Biofertilizers in sub-plot and replicated thrice. Conventional tillage recorded maximum tillers (434.16 and 371.13 m-2), plant height (61.78 and 99.32 cm), dry matter production (229.91 and 571.05 g m-2) and LAI (4.49 and 5.70) of forage oat at first and second cut, respectively. However, tillers and plant height at second cut and leaf-stem ratio at both the cut under conventional tillage were at par with zero tillage. Maximum total green forage yield (354.63 q ha-1), nutrient content viz. N (1.57%) and B (22.61 mg kg-1), crude protein (10.07%) and crude fiber (29.17%) under conventional tillage remained at par with zero tillage. Besides, the contents of Ca (0.46 %), Fe (123.53 mg kg-1), crude fat (1.01 %) and NFE (48.65 %) under zero tillage were significantly higher to conventional tillage. With regard to nutrient management, 125 % RDF recorded maximum tillers (455.83 and 421.78 m-2), plant height (62.56 and107.98 cm), dry matter production (239.15 and 591.24 gm-2), LAI (4.82 and 5.93) and L:S ratio (3.48 and 2.51) at first and second cut respectively and maximum total green forage yield (375.11 q ha-1). Similarly, content and uptake of nutrients and crude protein content increased with the increase in nutrient levels while, other quality parameters like crude fat and NFE decreased with increased levels of nutrient. Maximum crude fat (0.97 %), NFE (47.03 %) were recorded at 75 % RDF. Maximum weed density and their dry weight (14.83 g m-2) were recorded under minimal tillage. Weed density (213.78 m-2) and wed dry weight (12.17 g m-2) were higher at 125 % RDF compared to the lower levels. Influence of residual effect of tillage and nutrient levels applied to oat was also observed on transplanted rice. Maximum LAI (4.62) at 60 DAT, plant height at harvest (98.3 cm), effective tillers (231.5 m-2), panicle length (25.1cm), grains per panicle (52.5) and grain (32.60 q ha-1) and straw yield (57.64 q ha-1) were observed under the residual effect of zero tillage. Similarly, nutrient level at 125 % RDF was superior to the rest of the nutrient levels. Physical, chemical and biological properties of soil were influenced by tillage practices. Organic carbon (3.95 g kg-1), bulk density (1.56 Mg m-3), population of microorganisms and CO2 evolution were maximum under zero tillage while, available P2O5 (31.76 kg ha-1), K2O (162.0 kg ha-1) and water productivity (13.24 q ha-1cm-1) were maximum under conventional tillage. Net return from forage oat under zero tillage (`.54660 ha-1) was at par with conventional tillage (`. 55094) while, B: C ratio under zero tillage (2.47) was significantly higher to conventional tillage (2.24). In case of rice and oat-rice system, zero tillage was significantly superior to conventional tillage with regard to net return and B:C ratio. Energy use efficiency of the system under conventional tillage (9.35) was significantly superior over minimal tillage (8.31) and at par with zero tillage (9.23). Nutrient application at 125 % RDF to oat recorded highest net return, B:C ratio, net energy return and energy use efficiency in oat, rice and oat-rice system. Based on the above results, it may be concluded that forage oat sown under zero tillage and application of 100 kg N, 50 kg P2O5 and 25 kg K2O ha-1 followed by transplanted rice grown with a uniform tillage and fertilizers (90 kg N, 45 kg P2O5 and 30 kg K2O ha-1) in the system was a viable option for achieving improved system productivity, forage quality with highest net return, B: C ratio and energy use efficiency as well as improvement in soil fertility.

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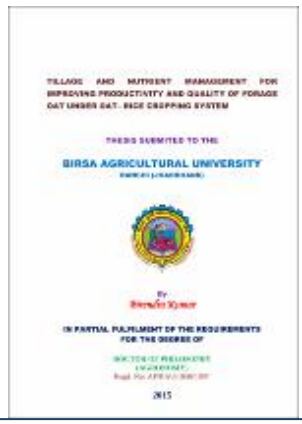

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