

Developing of New Triple-cropping Systems for Mass Forage Production in Upland Field

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[Introduction]

Multiple cropping system is an important agricultural system, which is significant to increase forage yield and promote agricultural economic development. We developed new cropping systems to increase the rate of arable land utilization and to improve the economical efficiency of domestic forage production by improving the forage productivity per unit area. We developed technology of maize and Italian ryegrass (IRG) + oat mixtures using triple cropping systems to improve the efficiency of land usage.

[Materials and Methods]

We used the maize (cv. Kwangpyeongok), oat (cv. highspeed) and Italian ryegrass (cv. Kowinearley). Maize was sown in early May and was harvested in mid-August. Oat and IRG mixtures were sown in late August and were first harvested in late October and second harvest was carried out the following year in early May after wintering. Seeding rates of maize, oat and Italian ryegrass were 40, 120 and 50 kg/ha, respectively. Fertilizer levels of Maize were 200-150-150 kg/ha (N-P₂O₅-K₂O). Oat + IRG mixed were 60-100-100 kg/ha as basal. The N fertilizer was applied 60 kg/ha as additional fertilization. After harvest of oat + IRG, fertilizer applied 40-120-120 kg/ha as basal. The N fertilizer was applied 100 kg/ha as additional in next spring. Seeding methods for maize, oat and Italian ryegrass were line sowing (planting space 0.75 x 0.16 m), line sowing (planting distance 0.3m) and broadcast planting, respectively. All plots were repressed after sowing had completed.

[Results and Discussions]

This experiment was carried out to develop triple cropping systems (summer cereals crop, maize - summer oat+autumn IRG mixed - IRG) for maximum year-around forage production at upland field. We also to select a planting space, and to examine the forage productivity and feed value. Silage yields of maize, oat and IRG were 48, 17 and 23 MT/ha, respectively. The total forage yields were 88 MT/ha in silage yield using these triple-cropping systems. As a nutritive value, crude protein and TDN contents were 8.3% and 70.6% in maize, 17.1 % and 62.9% in oat + IRG mixed, 7.6% and 60.5% in IRG, respectively. This study suggest that yields of high quality forages under triple-cropping systems have increased by 28% as comparing to double-cropping and real income of livestock farmer had increased by 39%. Therefore, triple cropping systems for the production of forage all throughout the year are possible with the introduction of summer oats and IRG mixture, and IRG could be the most suitable winter forage crops for triple cropping systems.

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