

S. Parveen, A. Kikuchi, and N. Nakagoshi (2002) The effect of farmer's management strategy on potential species richness in spring weed community of paddy field, southwestern Japan. p217. The VIII International Congress of Ecology, Seoul, Korea.



The purpose of this study was to evaluate the species richness and community structure of weed in the paddy field as affected by the farmers' management strategies. The management strategies include two broad categories; (i) use of chemical herbicide, (ii) without chemical herbicide, which includes; turning out hybrid-duck to graze in paddy fields, low input, sowing vetch, mowing and submerged the paddy field. The relationship between standing crop (STC) and species richness (SPR) was illustrated following 'Grime's hump-buck model and analyzed by partitioned regression model. Standing crop was predicted by indirect estimation method such as plant density index (PDI). The PDI serves as the proportion of the vegetation occupying a space from the ground surface in a 1m by 1m quadrat expressed as percentage. The field survey was conducted on April 2002, in farmers' paddy field, western Japan. The 58 herb layer vegetation were sampled using 1m by 1m quadrat, where the coverage (%) of 1m and the maximum height of each species (m) in each ten sampling points were measured. Ten samples were taken by clipping method, weighed and calibrated with PDI. Based on the PDI, 92.0% of the total variance in the wet weight was explained statistically (ANOVA,  $p < 0.01$ ). According to the cluster analysis based on Euclidean distance applied in standardized standing crop and species richness, the stands were consisted of five clusters such as 1) sowing vetch, 2) low input, 3) no herbicide in last season, 4) grazing by hybrid-duck, and 5) mowing and submerged. In the vetch field, potential primary dominant species ( $2900g < STC$ ) and low species richness ( $3 < SPR < 6$ ) were occurred. In the low input field, intermediate STC ( $1000g < STC < 2100g$ ) and higher ( $10 < SPR < 12$ ) species richness were found. In the mowed and submerged field low standing crop ( $STC < 750g$ ) and wide range of species ( $3 < SPR < 14$ ) were observed. Among the less standing crop community ( $STC < 1300g$ ), positive relationship was shown between standing crop and species richness as in the fifth cluster ( $SPR = 4.9098 \log_{10} STC - 2.39$ ,  $p < 0.01$ ,  $R^2 = 0.546$ ). On the other hand, negative correlation was shown ( $SPR = 21.137 \log_{10} STC + 79.414$ ,  $p < 0.01$ ,  $R^2 = 0.958$ ) between those in higher standing crop community ( $STC > 1300g$ ) such as first and second cluster. Comparing to these regression model, turning out hybrid-duck was characterized as less potential species density ( $3 < SPR < 5$ ) around 800g of standing crop, and without herbicide in last season was characterized as higher potential species density ( $12 < SPR$ ) around 1000g of standing crop. Submerged condition was primary related to stress adapted community occurrence. Our result shows that, standing crop was controlled by farmer's weed management strategy other than herbicide use such as mowing and sowing vetch. As a result, species mono-modal relationship was found between standing crop and species richness, like Grime's hump-buck model. Therefore, weed management strategy in last season had affected to potential species richness on spring weed community. Species richness was declined by the turning out hybrid-duck and was increased by no herbicide use. These reveal that the potential species richness of spring weed community is