Effects of fire frequencies on soil properties in dry dipterocarp forest at Sakaerat, Changwat Nakhonratchasima.

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ABSTRACT

Effects of fire frequencies on soil properties in Dry Dipterocarp Forest were conducted at Tam Bon Sakaerat, Amphur Pak-Thong-Chai, Changwat Nakhon Ratchasima, during 1984 to 1989. Six permanent sample plots, 20X40 $m.^2$ size of each, were laid out for investigating effects of fire on soil properties and were treated at different fire frequencies. The permanent sample plots no. 1, 2, 3, 4, 5 and 6 were assigned for annual burn, biennial burn, triennial burn, quadrennial burn, pentrennial burn and control respectively. Ten meter wide firelines were constructed around the permanent sample plots. Before burning, physical and chemical properties of soil were determined. After immediately burn, soil properties in permanent sample plots no. 1 to 5 were determined, and then the soil samples were collected again after burn every three months in six permanent sample plots for determining physical and chemical properties of soil by ratio of change method in order to find the effects of fire frequencies on soil properties.

The results revealed that after immediately burning soil moisture decreased by 53.57 percent while the bulk density, particle density, soil porosity, sand, silt and clay particles were relatively constant. Cation exchange capacity (C.E.C) and soil organic matter were increased by 31.00 and 9.52 percent, respectively. Soil pH was slightly increased after immediate burn. The plant nutrient increased after immediate burning, potassium was the maximum increased by 54.98 percent, and magnesium calcium phosphorus and sodium were increased by 47.76, 33.47, 7.82 and 1.05 percent, respectively. Sulphur content has 0.83 ppm after immediate burning while there was not sulphur before burning.

After five years study, soil moisture maximum increased by 44.57 percent in annual burn plot, and maximum decreased by 13.9 percent in quadrennial burn plot. The soil moisture was relatively constant in biennial burn, triennial burn and pentrennial burn plots. The bulk density in every plot did not change. The particle density in pentrennial burn changed the most proportion by 31.44 percent and the quadrennial burn changed the least proportion by 10.6 percent, the annual , biennial, triennial burn did not change. Soil porosity in the pentrennial burn changed the most proportion by 20.96 percent, the quadrennial burn changed the least proportion by 14.72 percent and the annual,

biennial and triennial burn did not change. The sand particle in annual burn changed the most proportion by 14.77 percent. The remaining plot did not change. The silt particle in annual burn changed the least proportion by 62.59 percent, in quadrennial pentrennial triennial and biennial burn decreased 40.77, 32.15, 29.02 and 11.13 percent, respectively. The clay particle in triennial burn increased the most proportion by 35.65 percent, the pentrennial and annual burn plot increased 32.52 and 17.57 percent, but biennial, quadrennial burn plot did not change.

For soil chemical property, soil pH in every plot did not change. For organic matter in annual burn increased the most proportion by 19.41 percent and the quadrennial burn decreased the most proportion by 59.12 percent, the pentrennial, triennial burn decreased by 40.46 and 38.72 percent, respectively. The biennial burn did not change. For C.E.C., in annual burn increased the most proportion 20.01 percent, the quadrennial burn decreased the most proportion by 45.11 percent, the pentrennial, triennial burn decreased 24.64 and 20.45 percent, respectively. The biennial burn did not change.

For phosphorus, in annual burn increased the most proportion by 53.85 percent, in biennial burn decreased the most proportion by 15.38 percent and the triennial, quadrennial and pentrennial burn plot did not change.

For potassium, in annual burn increased the most proportion by 41.57 percent, in triennial and biennial burn increased by 31.57 and 11.57 percent and the quadrennial, pentrennial burn did not change.

For calcium, in annual burn increased the most proportion by 120 percent, the triennial burn increased 55.27 and 35.92 percent, respectively. The biennial burn decreased by 13.39 percent, the quadrennial burn did not change.

For magnesium, in every plot, the annual burn increased the most proportion by 128.12 percent, the triennial, biennial, quadrennial burn decreased by 13.46, 12.76 and 12.76 percent respectively. The pentrennial burn did not change.

For sulphur, before burning, no sulphur in every plot, but after 5 years burn, sulphur was found in the biennial, triennial burn by 2 ppm, but the annual, quadrennial, and pentrennial burn, sulphur was not found.

The result of five years study revealed that the annual burn has increased the plant nutrient the most proportion than other plots and the next most is the triennial burn.