ヤクシカ（*Cervus nippon yakushimae*）の採食圧が屋久島の森林下層植生に与える影響

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１はじめに

鹿児島県南部の屋久島は，常緑広葉樹林から上部のスギ林，山頂部のササ草原に至る植生の垂直分布が自然状態で残存している地域として知られ、その希少な植生を含む生態系は世界自然遺産に登録されている。一方、西部地域など一部ではニホンジカの亜種であるヤクシカ(*Cervus nippon yakushimae*)が高密度で生息し、その生息密度が増加傾向にあることが知られている。森林更新の阻害など植生への影響が懸念されているが、シカ採食圧が森林更新動態に与える影響に関しては研究事例が乏しく、ほとんど知られていない。標高経度に沿って異なる植生が成立している屋久島の森林では、植生帯ごとにシカ採食圧の影響も異なると考えられるため、(1)シカ採食圧により森林下層植生が受ける影響の種類，(2)シカ生息密度と森林下層植生が受ける影響大きさの関係の 2 点について，常緑広葉樹林とスギ林の 2 つの異なる植生帯において明らかにすることを目的とした．

２調査地および調査方法

屋久島の西部半山地域および花山歩道周辺において、標高の異なる 7 調査区を設定し、シカ生息密度調査、下層植生調査、防鹿柵実験を行った。また西部と比較してシカ生息密度が低いといわれる東部の安房林道周辺の 4 ヶ所の自然林において林床植生調査、シカ生息密度調査を行った。

３結果および考察

スギ林の下層では，常緑広葉樹林の下層で見られたようなシカ生息密度と植生の状態との間に強い相関は見られず，ヤクシカの生息密度以外の要因が森林下層植生の状態により強く影響を与えていることが示唆された．スギ林の林床は，酸性土壌や温度条件により，0m～900m までに見られるような森林下層植生と比べ性質の大きく異なる植生が成立していることが，その要因として挙げられる．

一方、屋久島の常緑広葉樹林帯では，同様の光環境下で比較した場合，ヤクシカ生息密度が高い場所ほど下層植生の多様度，バイオマス，木本実生の個体密度の値が小さくなる傾向が見られた．ヤクシカ生息密度が高い場所では，シカ採食圧により，高さ 100cm 以下

の森林下層植生が質的，量的な影響を受けていることが示唆された.

またシカ柵実験から，下層植生に影響が出始めるシカ生息密度を推定した。生息密度が 40～60 head/km² を越えるあたりから，シカ採食圧が実生・稚樹個体の死亡率に対して影響を与え始めていた．また，シカ生息密度とバイオマス量の増減には強い相関があり，シカ生息密度が 50～70 head/km² 近辺を越えると，年間のバイオマスの変化量が減少に転じ、シカの採食により失われるバイオマス量が植物の生長量を上回り始めることが示唆された.

以上のことから，常緑広葉樹林では，シカ生息密度が 40～70 head/km² を超えると，植生には量的に負の影響が明瞭に出始めるということが分かり，屋久島の森林下層植生の状態とヤクシカ生息密度との関係について考えるうえでひとつの目安となることが考えられた．今後さらに調査地点数を増やし，両者の関係についてデータを蓄積することで，現在の植生の状態とヤクシカ生息密度から，将来の植生の状態を予測できるようなモデルを構築することも可能となるだろう.

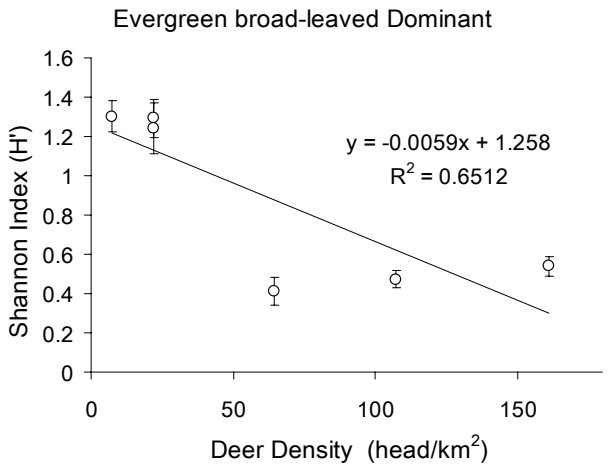

Fig.1 Correlation between deer density and Shannon Index on evergreen broad-leaved dominant plots under similar light intensity .

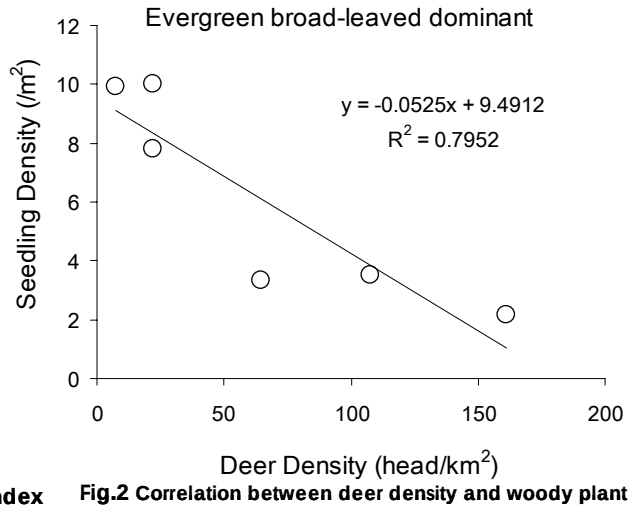

Fig.2 Correlation between deer density and woody plant individuals under 100cm on evergreen broad-leaved dominant plots under similar light intensity .

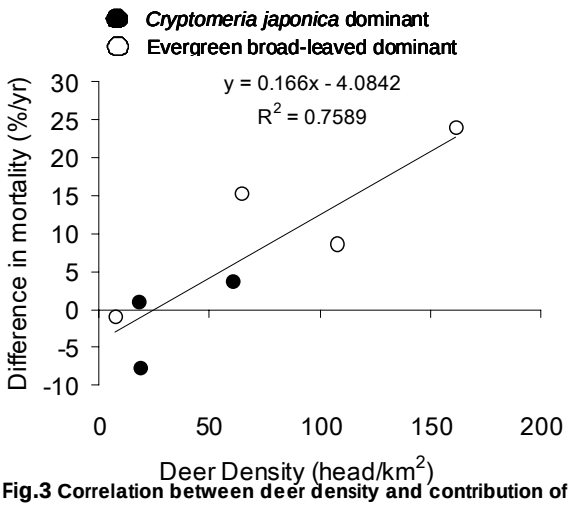

Fig.3 Correlation between deer density and contribution of deer grazing pressure (difference in mortality(%/year) of woody plant individuals under 100cm, between in or out of exclosure) on Western Yakushima .

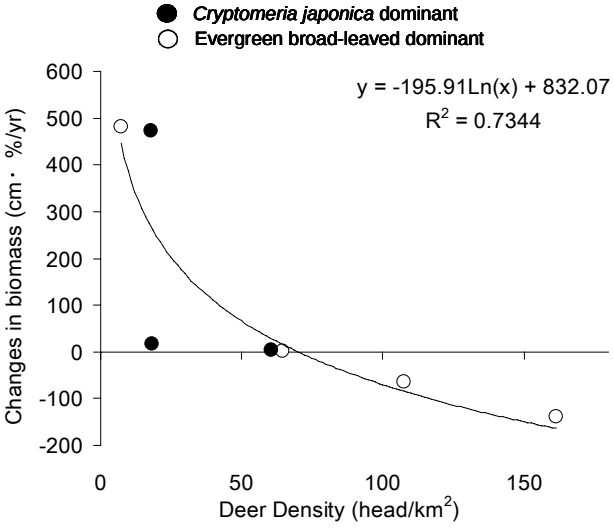

Fig.4 Correlation between deer density and changes in biomass of understory vegetation (woody plant individuals under 100cm) outside of exclosure on Western Yakushima .

The Efffects of Grazing Pressure of Sika Deer (*Cervus nippon yakushimae*)on Understory Vegetation in the Forest on Western Yaku-Island, South Japan

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Keywords : *Cervus nippon*, Yakushima Island, Pellet group counting method,
Deer exclosure experiment

1 . Introduction

Yakushima Island in southern Japan is known for its rich vegetations. From evergreen broad-leaved forest in lower part to cedar forest on upper area, its natural vegetation is well preserved and we can see the altitudinal distribution of vegetation. The forest includes its rare ecosystem is known as world natural heritage site.

On the other hand, a variety of Japanese sika deer (Cervus nippon) called yakushika(*Cervus nippon yakushimae*) is densely populated in some part of the island and its population density is increasing. Grazing pressure of densely populated sika deer often cause disturbance on forest regeneration. However, there are few reports or studies on relationship between deer and forest vegetation, and very little is known about it. To clarify how deer affect on vegetation, and how much deer density affect on vegetation seriously, I conducted survey on vegetation and deer density on different vegetation zones distributed along altitude.

2. Materials and Method

I set 7 plots on western Yakushima for understory vegetation survey, deer density estimation, and deer exclosure experiment. Every plot is set on different altitudes from 0m a.s.l. to 1600m a.s.l. In addition I also set 4 plots on eastern yakushima , where its deer density is lower than western plots expectedly. I conducted forest floor vegetation survey and deer density estimation on the eastern part. Plots on higher altitude is *cryptomeria japonica* domionant forest and lower altitude is evergreen broad-leaved forest)

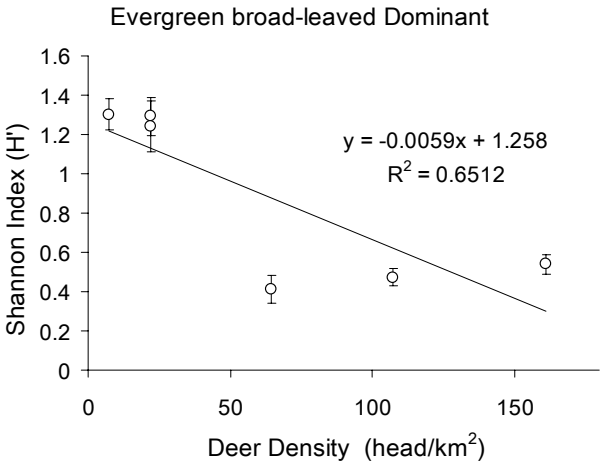
3 .Results and discussions

No correlation between deer density and status of vegetation could be seen on *Cryptomeria japonica* dominant forest.

On the other hand, there were correlation between population density of sika

deer and states of vegetation. As population density of sika deer increases, values of heterogeneity index of vegetation (Fig.1), biomass of understory vegetation, and density of woody plant individuals under 100cm in height (Fig.2) decrease. It is clarified that the high grazing pressure of sika deer affects the forest floor vegetation in its quality and quantity.

Deer exclosure experiment shows the similar results. Deer density and amount of difference of seedling mortality between plots in and outside of exclosure was correlated (Fig.3). It suggests that grazing pressure of sika deer contributes to the mortality of woody plants seedlings strongly. Mortalities of seedlings are clearly different on when deer density is over 40-70 head/km^2. Amount of changes in biomass of vegetations is negative when the deer density ids higher than 50-70 head/km^2 (Fig.4). For these reasons, on evergreen broad-leaved forests , understory vegetation are affected when deer density is around 40-70 head/km^2.



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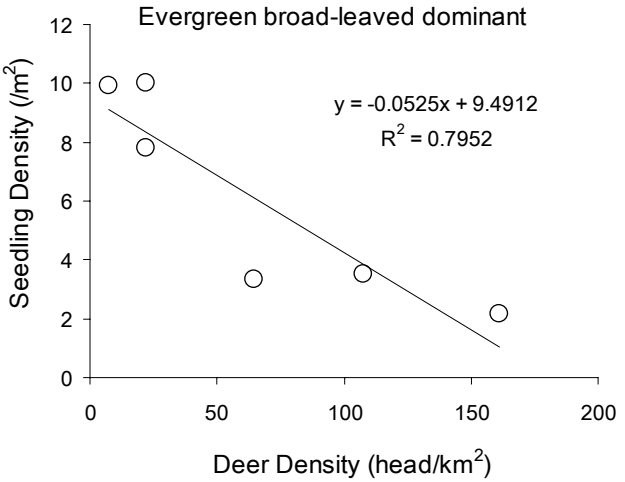

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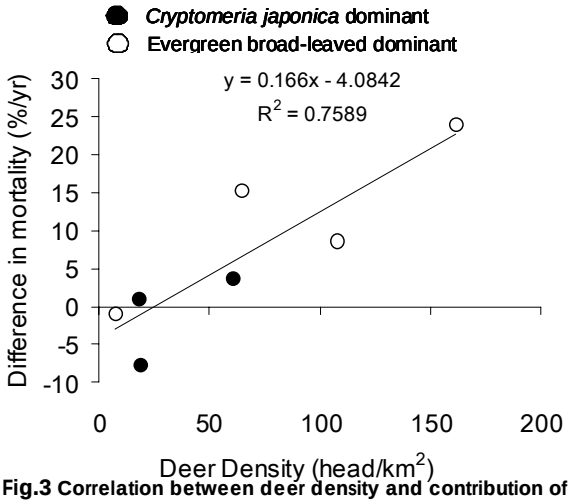

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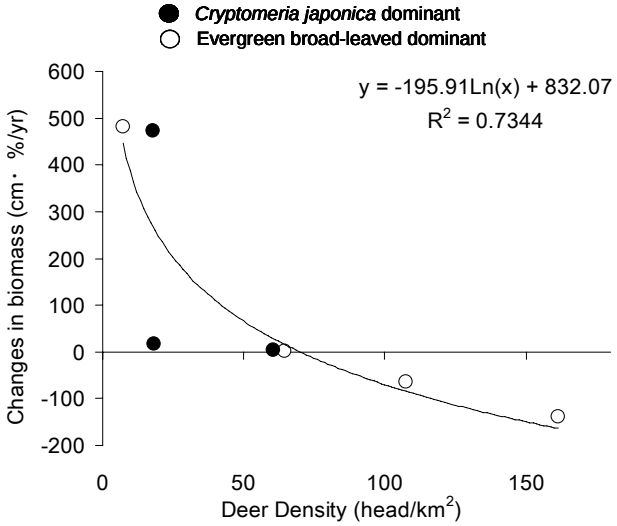

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