P2.11 AN ESTIMATION METHOD FOR MALE FLOWER PRODUCTIONS OF JAPANESE CEDAR

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1. INTRODUCTION

The relationship between male flower production of Japanese cedar and meteorological factors is known as that the flower production has a positive relationship with sun duration in previous summer and has a negative relationship with precipitation in previous summer. On the other hand, it is known that the male flower production has a rich and poor cycle because of the shortage of nutrients inside of trees (if trees produced lots of flowers, inside nutrients were consumed greater). In this research, we focused on the relationship between net primary production estimated from meteorological factors and the cost distribution ratio for individual growth, male flower production, and seed fruition. Through the research, we established an estimation method of male flower production with meteorological factors and a cost balance model of net primary production.

2. THE ESTIMATION of NET PRIMARY PRODUCTION

For a photosynthetic production, we adopted the Michaelis-Menten hyperbolic function model (Farquhar et al. 1980, Farquhar and von Caemmerer 1982, von Caemmerer 2000). For an estimation of respiration volume at branches and roots, we adopted an exponential function. And for an estimation of respiration volume at leaves, we adopted a linear function based on the assumption that leaves' respiration is proportional to the maximum carboxylation rate. Additionally we considered the effect of stomatal conductance variance with humidity and the thermal dependency of photosynthesis.

3. MASTING

For the estimation of masting, we input a net primary production estimated by above functions in the Resource Budget model (Isagi et al, 1997). In the estimation, we supposed the distribution ratio for seed fruition and male flower production (seed fruition / male flower production) was 0.6 to 0.8, estimated from dry weight ratio of flowers and seeds and from dispersion of individuals.

4. RESULTS and DISCUSSION

We estimated the cost of male flower production from 2001 to 2007 with meteorological factors observed at Tokyo meteorological observatory and these models. The estimated cost of production had a strong positive relationship with the actual flower production observed (Fig.1 and Fig.2).

The cost for male flower production was estimated 0.4 to 8.9 mgCO_2 at square meter, the production of male flowers was 1,090 to 15,240 flowers at square meter, and the cost for one male flower production was estimated 0.0006 mgCO_2.

5. REFERENCES

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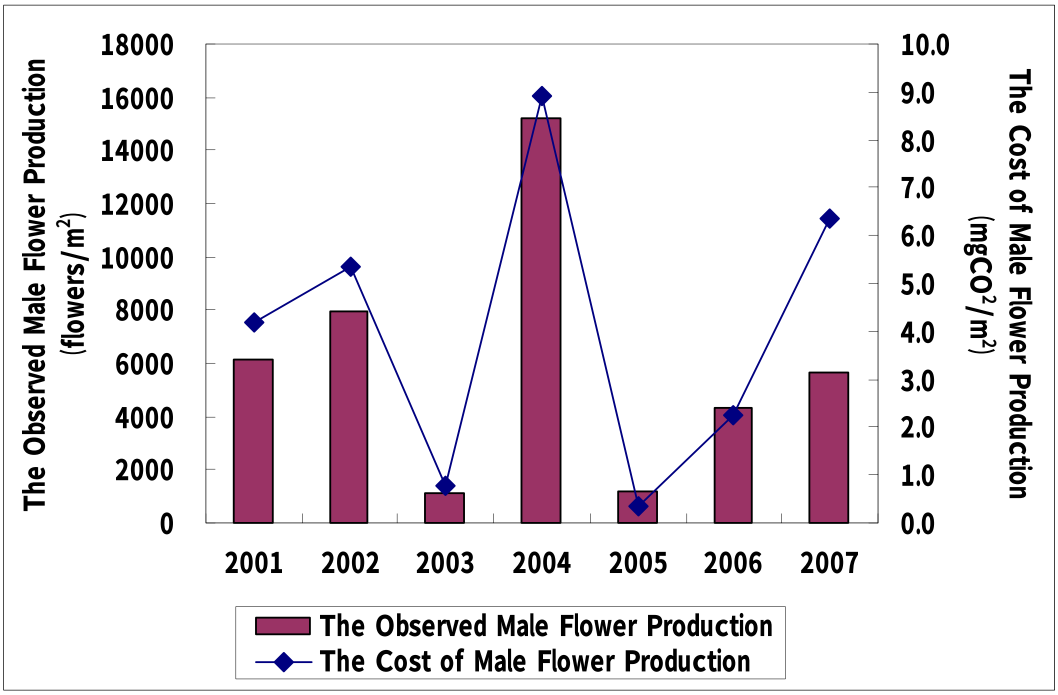

Fig. 1 Annual variation of the estimated cost of male flower production and the observed male flower production

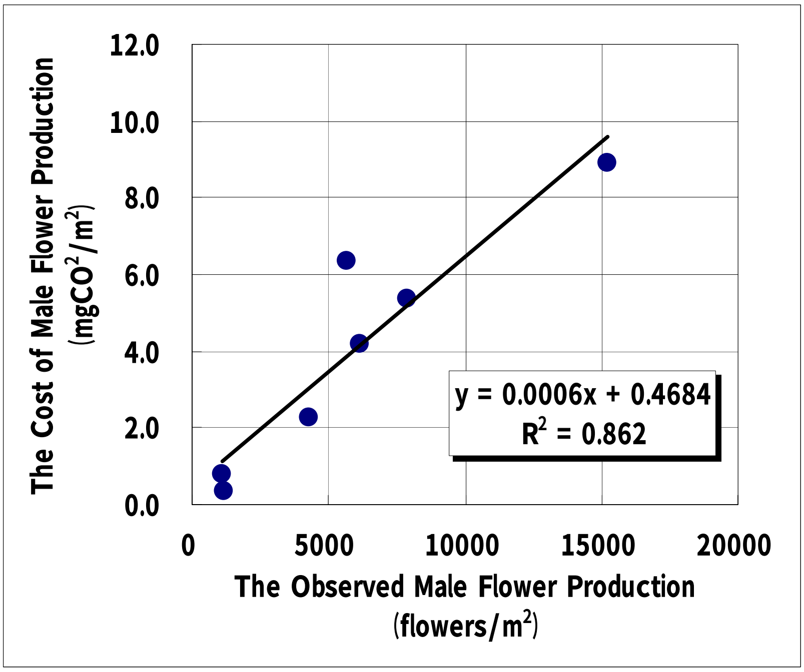

Fig. 2 Relationship between of the estimated cost of male flower production and the observed male flower production