

# 論 文 要 約

Life-history strategies of the invasive naturalized tall bamboos in Japan

(日本国内で分布拡大しているタケ類の生活史戦略の解明)

Keito Kobayashi

## 論文要約

In this doctoral thesis, I clarified unique life-history strategies of the tall bamboos (genus *Phyllostachys*) that should be responsible for their strong invasive capacity in forest ecosystems in Japan. The life-history strategy of *Phyllostachys* bamboos is often characterized by (1) long-term vigorous clonal growth and (2) monocarpic reproduction. In the expansion phase of bamboo ramet population, the new tall ramets, which are comparable to forest height, are produced from the rhizomes that are extended into the expanding forest areas. The new ramets compete for resources especially light with the existing trees with comparably less investment into stems due to their hollow structure. When the ramets are superior in the competition, further new ramets are produced, and the bamboo ramet populations are gradually expanded into the adjacent forests (Chapter 2). Once a pure bamboo stand is established, the bamboo stand can maintain and enlarge their stand stock through replacing the old smaller ramets with new larger ramets year by year, where the self-thinning rule (i.e., log mean plant mass is negatively correlated with log population density by  $-3/2$  power) is held (Chapter 3). The ability to further increase their stand stock over years may imply that once bamboo stands established, they become more resistant against invasions of other trees. During the clonal growth phase, the production of the above-ground ramets is coordinated by the below-ground rhizomes, and their high biomass accumulation due to their long longevity may be important in ecosystem functions of bamboos (Chapter 4). While it has been observed that some *Phyllostachys* bamboos show mass-flowering after long clonal growth, they fail to set mature seeds probably due to a limited genetic variation at least in *P. nigra* var. *henonis* in Japan. While most of the ramets died after the mass flowering, some ramets in the flowered stands survive and continue their vegetative growth. This capacity to avoid local extinction of the bamboos may be related to the fast recover and repeated expansions into the adjacent forest areas (Chapter 5). These studies have demonstrated the unique life-history strategies of the tall bamboos (*Phyllostachys*) in Japan, which can explain their high invasive capacity to displace established forests.

These studies have also contributed to deepening the general bamboo ecology. The knowledge obtained in this thesis may be useful to take some appropriate actions in managing the invasive naturalized bamboo stands in Japan and elsewhere.