

PHENO-BIOLOGICAL CHARACTERISTICS OF ALOKON: A PROMISING VEGGIE

Menisa A. Antonio*, Evangeline S. Galacgac and Rodel T. Utera

Mariano Marcos State University

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Rationale

Vegetables receive comparatively less focus and support, and much less for the indigenous species, as compared to those received by big-ticket commodities (i.e. rice and corn) in the Philippine agriculture. This is one of the factors why vegetable consumption in the country remained low at 111 g per capita per day or 40 kg per capita per year (FNRI 2008 in Maghirang *et al* 2018), a level way below the recommended 400 g per capital day or 150 kg per capita per year (FAO/WHO 2003).

In some Asian countries such as Thailand and Vietnam, indigenous vegetables (IVs) contribute in bringing forth a stable and reliable vegetable supply. The Philippines likewise has a wealth of IVs, which can supply the gap in supply and demand. Many IVs are wild and neglected species, but gaining importance as resource for food and nutrition. Information on many IVs is still limiting, thus bridging information gaps such as their biology, production technology, and varieties with decided consumer appeal and acceptability, among others, is needed. This information is important in setting priorities for the development and promotion of these indigenous species.

Through the MMSU-SEARCA-SFRT Project on Indigenous Food Plants (IFPs) in Ilocos Norte, *Broussonetia luzonica* (Family Moraceae), locally called alokon (Ilk.), himbabao (Tag.) or alibagbag (tawis), is one of the 46 IFPs documented in the province (Antonio et al, 2011). It is a popular indigenous vegetable in the Ilocos commanding as much as P200 to P500 per kilogram of inflorescence depending on the month of availability. The staminate inflorescence is a favorite for vegetable stews.

At present, research on Alokon is still limited. Most of the information available are the species taxonomy, distribution, ethnobotany, and chemical and nutrient components. Brief botanical description, local distribution and ethonobotanica information were given in Antonio, Agustin and Badar (2016). The inflorescence, stem and leaves contain flavonoid, saponin, terpenoid and xanthoprotein, and exhibit free radical scavenging activity in vitro (Antonio et al, 2015).The plant remains wild-growing, with no known recommended varieties and formal production technology. To identify acceptable accessions, a preliminary sensory evaluation was made earlier by UPLB-IPB and MMSU. However, the germplasm evaluated was not exhaustively sourced from the *Alokon*-growing areas in the province.

* Corresponding author. E-mail: menisaantonio@yahoo.com

Thus, this study aimed to establish information on the plant's growth and development, and select accessions or 'varieties' with decided consumer appeal and acceptability. Alokon inflorescence commands high price especially during the months of November and December. Information on its biology provide basis in introducing interventions to induce/manipulate flowering during low supply or for year-round supply, if possible. Additionally, flowering of Alokon in the Ilocos peaks in the months of February to March. However, some 'varieties' flower as early as late November; others as late as April. Identifying early- and late-maturing varieties will enhance longer supply of inflorescence. At the moment, there has been no identified or registered varieties yet. Identifying varieties with consumer-accepted advantage will enhance consumption and utilization, thereby facilitating the establishment of a market niche as a vegetable crop.

Objectives of the Study

1. To document the growth and development stages, and morphological and reproductive characteristics of Alokon.
2. To determine accompanying changes in the plant at each event in the phenological cycle.
3. Identify weather variables affecting the phenological events of Alokon.
4. To identify the ongoing changes in the phenological cycle of Alokon.

5. To select potential 'varieties' based on eating qualities and flowering habit.

Methodology

Naturally growing Alokon trees in four ecological zones (central lowland, northern coastal, southern coastal, eastern interior) and mountainous area in Ilocos Norte were identified for monitoring purposes (Fig. 1a). Two to three trees were selected to represent each zone. These were monitored bi-monthly during the vegetative stage and weekly from the start of reproductive stage to end of flowering. Additional naturally growing trees were also identified in different towns of Cagayan and Apayao (Fig. 2b) and monitored for the same purpose. This was done to compare the effect of different climate types on the phenological cycle of the species.

Using the selected sample trees, the dates of occurrence of the different phenophases or phenological events and flowering periods were recorded. Phenophase descriptions were adapted from the Project Budburst Phenophase Field Guide (<http://www.windows.ucar.edu>) and the methods were adapted from the National Phenology Network (Haggerty and Mazer, 2008). In addition, the following characters were also observed/monitored in the identified trees: 1) morphological characters such as growth habit, edible part and other physical attributes; 2) reproductive characters- such as dioecy, flower type, flowering behavior, floral morphology, and duration of flowering; growth/developmental stages per cycle; and propagation such as seed germinability and survival of cuttings.

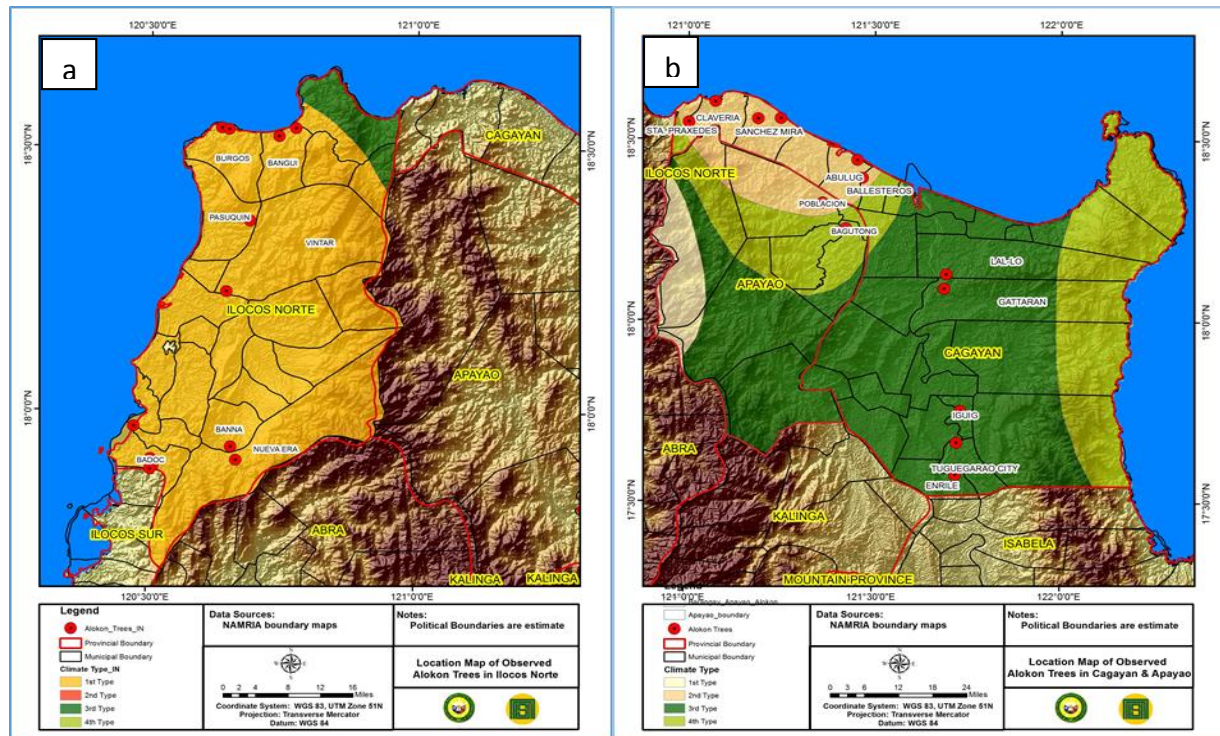


Figure 1. Location map of the observed Alokon trees in Ilocos Norte (a) and in Cagayan and Apayao (b).

Significant Findings and Implications

1. The growth and development cycle of Alokon consists mainly of vegetative, intermediate and reproductive phases (Fig. 2). The vegetative phase lasts for 7 to 8 months (March to October) while the reproductive phase lasts for 4 to 5 months (late November to March). The specific phases are accompanied by morphological changes in the plant such as: a) leaf bud emergence, b) full leaf development, c) leaf maturity, d) leaf yellowing and senescence, e) leaf abscission, f) leafless, g) floral bud emergence, h) flower development and flower physiological maturity.
2. Regardless of ecological zone in Ilocos Norte, trees follow similar phenological cycle and period of occurrence over the three-year observation period. Flowering period is generally from January to March, peak is February. However, a few trees exhibit extreme cases, not conforming to the regular cycle and period of occurrence.
3. Comparing trees in Ilocos Norte, Cagayan, and Apayao which belong to different climate types, the phenological cycles are similar but flowering period varies. Flowering period under Type 1 climate of Ilocos Norte is generally from January to March, peaking in February. Flowering in Type 2 (northwestern

Cagayan and northern Apayao (i.e. Luna) and Type 4 climates is generally from January to March but behind of Ilocos Norte by about 2 to 3 weeks, hence, peak of flowering is in the month of March. Flowering under Type 3 climate in Cagayan is generally from April to June. There exist few to some cases of early flowering, double flowering and late flowering in above areas (Figure 2).

- Climate, weather factors such as temperature and daylength and biological factors such as age and variety of tree, appeared to affect the occurrence and duration of the different phases, and some flower characteristics.

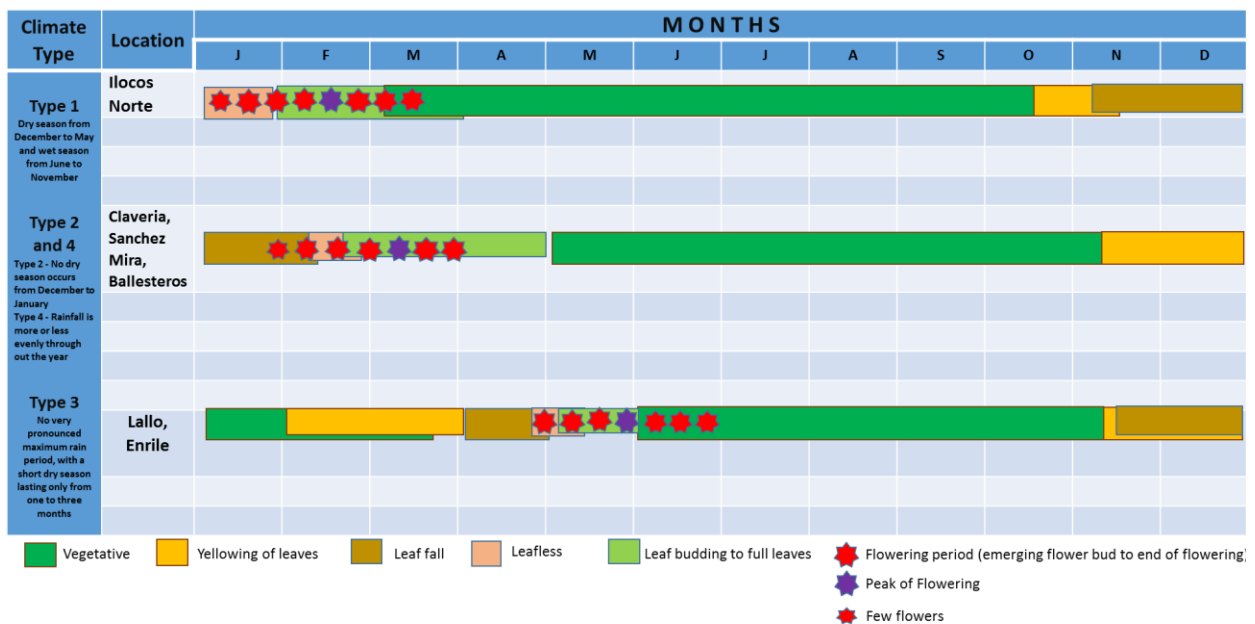


Figure 2. Phenology of *Broussonetia luzonica* in different Climate Type.