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Valuing possibilities for *Amorpha fruticosa* L. populations found in Romania

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PROBLEM

Amorpha fruticosa L. (false indigo, river locust) was used in Romania for degraded land reclamation due to its adaptability in poor site conditions.

- it is found along the Danube River and main tributary river floodplains;
- the species great ecological amplitude turned it invasive especially in wetlands with negative impact on protected areas (e.g. Natural Parks, Natura 2000 sites).

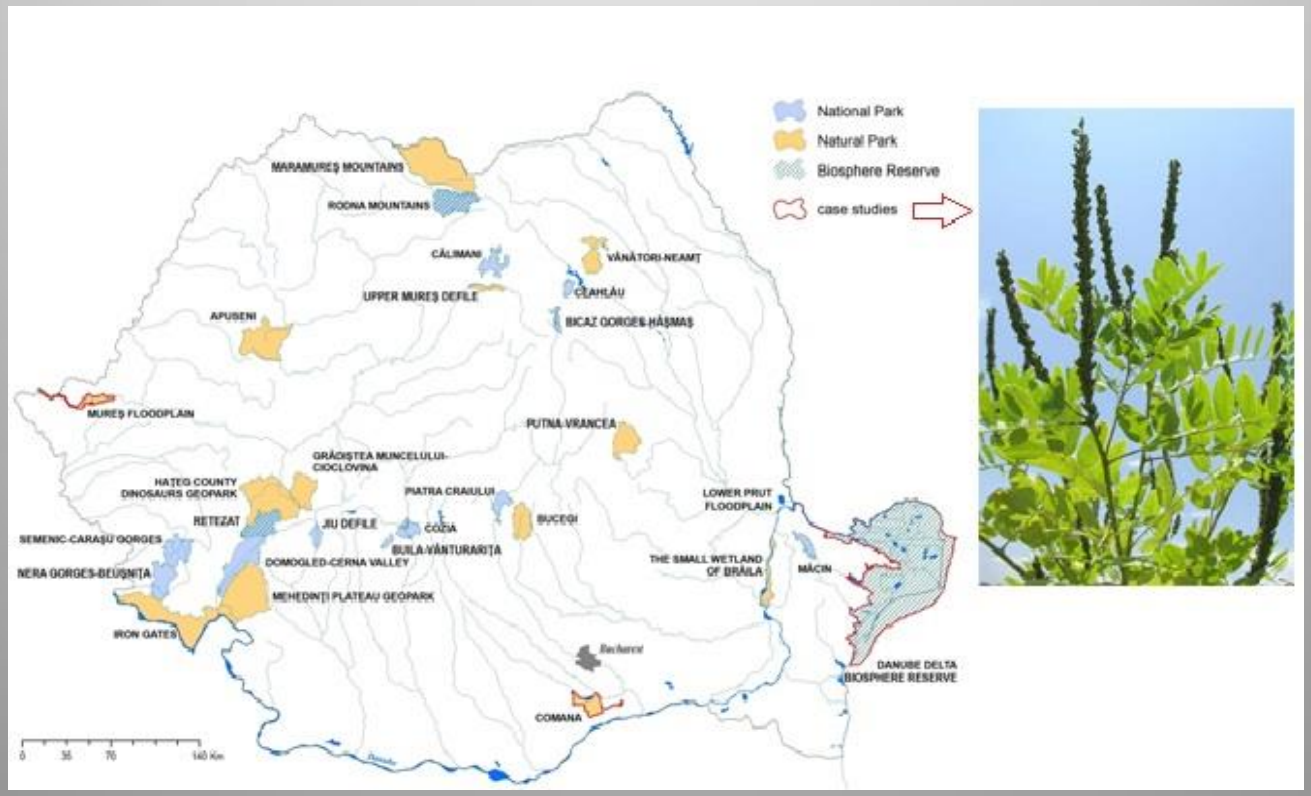

Figure 1. Protected areas where *Amorpha fruticosa* L. is abundant (Dumitrascu et al. 2013)

• *A. fruticosa* covers large areas quickly (especially where seasonal flooding occurs), and competes for space and nutrients with native species (e.g. willow, poplars).
- has a negative impact on the natural regeneration process of native forest habitats.

Figure 2. False indigo under white poplar regeneration in Small Wetland of Braila Natural Park (Photo: Ciuvat L.)

Proposed solutions

• After consulting the available bibliography on false indigo, the published results were structured in three separate categories of possible uses: *medicinal, food and industrial*.
• *land reclamation use was not taken into account* as it implies increasing the spread of the species.

❖ ***Medicinal uses***

• the **fruits** (pods) and stems are the parts most studied for medicinal uses;
• new rotenoid glycoside extract has effect on the growth of human immune cells;
• besides rotenoid and flavanon compounds with antimicrobial and anticancer properties, the volatile oil extracted from the seeds manifested moderate antibacterial activity against Gram-positive bacteria (e.g. *Staphylococcus aureus, Sarcina lutea, Bacillus cereus, B. subtilis*) highlighting wound healing properties;
• new extract with antioxidant activity proves useful in therapy of free radical pathologies and neurodegenerative disorders (e.g. Alzheimer) and diabetes;
• potential use for the mammalian cell culture media formulation by replacing the animal serum and as green alternative to existing synthetic corrosion inhibitors.

❖ *Food uses*

• food additives like natural colorants or as a spice;
• false indigo has a high melliferous potential. (products like honey, pollen and propolis, have high nutritional value);
- Blooming (abundant) occurs in late May - early June with a long flowering period of 20-25 days, and reported quantities range between 55 kg (age 6) and 113 kg (age 9) of honey per 1 ha.
• the honey is reddish in colour with mild taste and fragrance;
• the species can be an alternative forage source for game (e.g. pheasants eat seeds) and fodder for livestock (e.g. sheeps and goats eat the leaves)
small locust has a high second-year leaf concentration, averaging 660 g kg^{-1} DM;
• fodder quality is high, with average crude protein (CP), acid detergent fiber (ADF), and neutral detergent fiber (NDF) concentrations in July of 205, 226, and 235 g kg^{-1}, respectively.

Figure 3. *A fruticosa* flower

Figure 3. *A fruticosa honey*

Figure 3. *A fruticosa* seed

❖ *Industrial uses*

The resinous pustules located on the plant (fruits, leaves, root) contain chemical substances ('amorpha') that can be used for insecticidal or insect repellent purposes;

- potential use in pharmaceutical industry (e.g. natural mosquito repellent);
- false indigo biomass use benefits:
  - widen the range of forestry products
  - reduce the cost of forest regeneration
  - offer additional income possibility to rural communities from harvesting the false indigo;
  - used as fuel for biomass power plants;
- dry biomass production varies from 7.28 t/ha to 12.18 t/ha, with moisture less than 35%, ash content of 1.5%, and calorific value of up to 16.9 MJ Kg^{-1};
- very suitable for pellet production.

Figure 6. Harvesting false indigo (Photo: Csaba Vaszko, Source: WWF)

Conclusions and Discussions

- In Romania the species is appreciated for its high melliferous potential;
- new research in medicine (national and international) for developing natural remedies and other green technologies (e.g. corrosion inhibitors).
- Valorisation of species benefits can be realized in three different stages:

- first stage: pollen collecting for honey production (in spring);
- second stage: fruit gathering for medicinal purposes (during autumn);
- third stage: harvesting of biomass for industrial use (during winter).

- False indigo covered areas can be managed as short rotation crops (SRC) for biomass, with a harvesting cycle of 1 to 3 years depending on site conditions.
- Harvesting technology required is similar to that used for common reed.

Significant areas covered by *Amorpha fruticosa* L. in Romania require a sustainable control that can be achieved by valuing its biopotential.

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