Model for *Pinus pinea* Central Mountains (Spain)

Model

PINEA Sistema Central

Individual tree growth model for *Pinus pinea* in Sistema Central (Spain)

Figure 1: *Pinus pinea*

Model description

- Species: *Pinus pinea* L.
- Species SFNI (Spanish Forest National Inventory) code: 23
- Geographical area: Central Mountains
- Geographical area (administrative): Palencia, Zamora, Valladolid, Burgos, Salamanca, Ávila, Segovia y Madrid

Figure 2: Details of *Pinus pinea*

Model requirements and recommended use

- Initial inventory requirements: age, dominant height and basal area of the plot; expan and dbh of the trees
- Geographical area: Sistema Central, closer places and another places with similar characteristics (assuming differences)
- Stand type: monospecific stands
- Execution recommended time: 5 years executions (growth equation developed by using that criteria)
- Site Index is defined as top height at a base age of 100 years

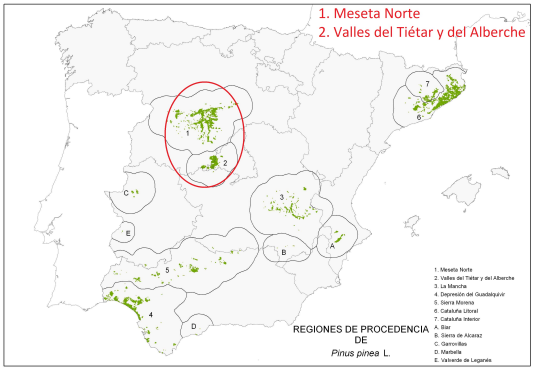


Figure 3: Provenance regions of *Pinus pinea* in Spain

Bibliography

SIMANFOR model recommended citation:

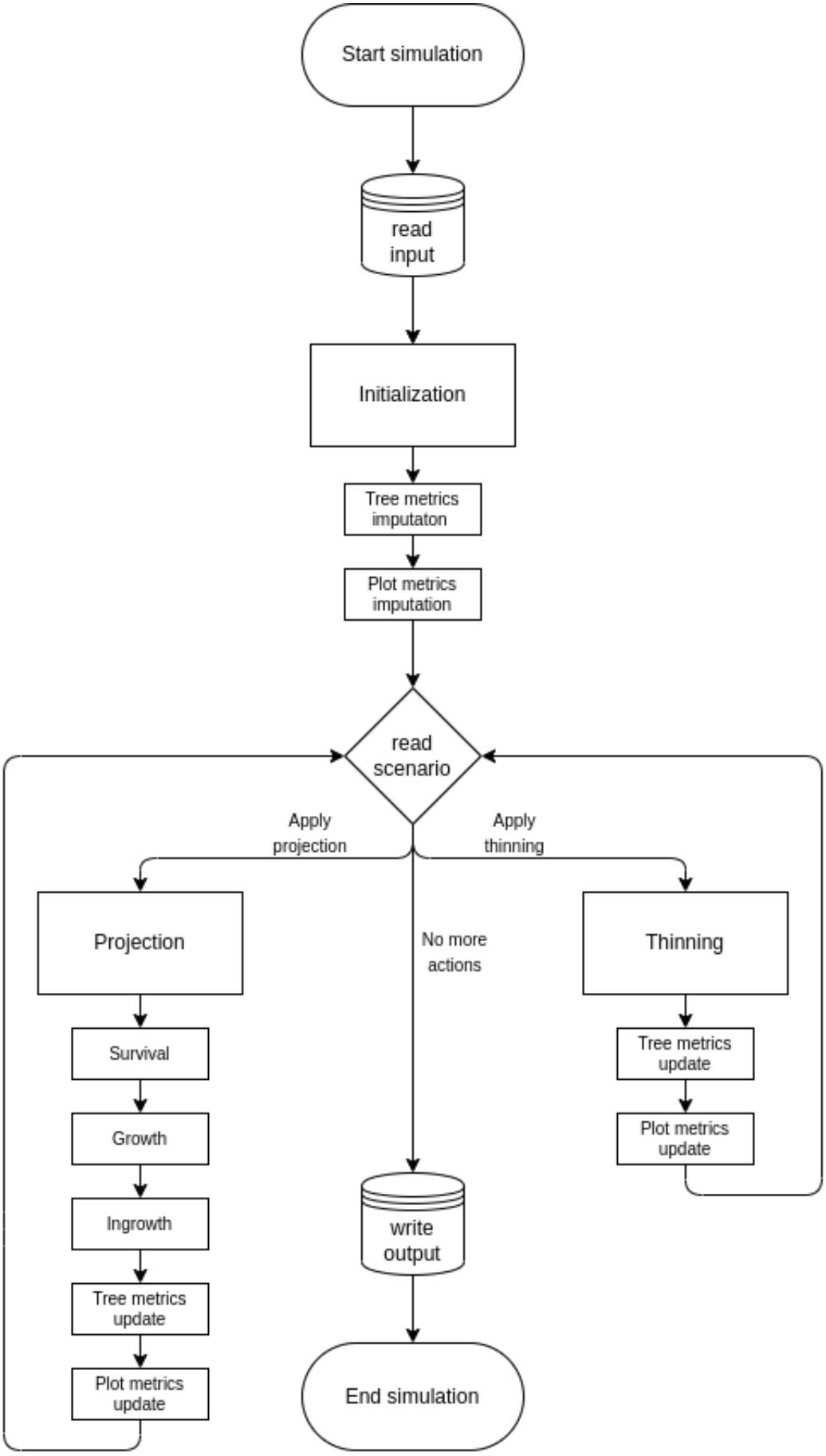
SIMANFOR (year). Individual tree growth model independent from distance for stone pine (*Pinus pinea*) in Central Mountains (Spain). https://www.simanfor.es/

Model components:

- **Site Index equations**:
  Calama R, Cañadas N, Montero G (2003). Inter-regional variability in site index models for even-aged stands of stone pine (Pinus pinea L.) in Spain. Annals of Forest Science, 60(3), 259-269
- **Diameter growth equation**:
  Calama R, Montero G (2005). Multilevel linear mixed model for tree diameter increment in stone pine (Pinus pinea): a calibrating approach. Silva Fenn, 39(1), 37-54
- **General calculations: bal, g, slenderness, normal circumference**:
  Standard equations
- **Generalized height-diameter equation**:
  Calama R, Montero G (2004). Interregional nonlinear height diameter model with random coefficients for stone pine in Spain. Canadian Journal of Forest Research, 34(1), 150-163
- **Taper equation over bark (volume)**:
  Rodríguez F, Lizarralde I (2015). Comparison of stem taper equations for eight major tree species in the Spanish Plateau. Forest systems, 24(3), 2
- **Taper equation under bark (volume)**:
  Calama R, Montero G (2006). Stand and tree-level variability on stem form and tree volume in Pinus pinea L.: a multilevel random components approach. Forest Systems, 15(1), 24-41
- **Biomass equations**:
  Ruiz-Peinado R, del Rio M, Montero G (2011). New models for estimating the carbon sink capacity of Spanish softwood species. Forest Systems, 20(1), 176-188
- **Technological wood uses information**:
  Rodríguez F (2009). Cuantificación de productos forestales en la planificación forestal: Análisis de casos con cubiFOR. In Congresos Forestales
- **Cone production equations (total)**:
  Calama R, Gordo FJ, Mutke S, Montero G (2008). An empirical ecological-type model for predicting stone pine (Pinus pinea L.) cone production in the Northern Plateau (Spain). Forest Ecology and Management, 255(3-4), 660-673
- **Healthy cones and seed production equations**:
  Calama R, Montero G (2007). Cone and seed production from stone pine (Pinus pinea L.) stands in Central Range (Spain). European Journal of Forest Research, 126(1), 23-35
- **Value for Reineke Index equation**:
  Aguirre A, Condés S, del Río M (2017) Variación de las líneas de máxima densidad de las principales especies de pino a lo largo del gradiente estacional de la Península Ibérica. 7 Congreso Forestal Español

Figures:

- **Figure 1:** by Manfred Werner is licensed under CC BY-SA 3.0
- **Figure 2:** website: `https://www.pinterest.es/pin/443182419564410245/`
- **Figure 3:** extracted from MAPA


Start simulation
read input
Initialization
Tree metrics imputaton
Plot metrics imputation
read scenario
Apply projection
Apply thinning
No more actions
Projection
Survival
Growth
Ingrowth
Tree metrics update
Plot metrics update
Thinning
Tree metrics update
Plot metrics update
write output
End simulation

Contacts

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Related information

SIMANFOR - Support System for the Simulation of Sustainable Forest Management Alternatives. Website (`https://www.simanfor.es/`) **and GitHub repository** `https://github.com/simanfor`

iuFOR - University Institute for Sustainable Forest Management. Website: `http://sostenible.palencia.uva.es/` y `https://iufor.uva.es/`

ETSIIAA Palencia - Higher Technical School of Agricultural Engineering of Palencia. Website: `http://etsiiaa.uva.es/`

UVa - University of Valladolid. Website `https://www.uva.es`