SIMANF🌳R

Model for *Pinus nigra* stands
Castilla y León (Spain)

Model

Pnigra_stand__cyl__v01.py

Model description

- Specie: *Pinus nigra* Arnold

- Spanish Forest Inventory (SFI) code: 25

- Geographical area: Castilla y León

- Geographical area (administrative): León, Palencia, Burgos, Zamora, Valladolid, Soria, Salamanca, Ávila and Segovia

Figure 1: *Pinus nigra*

Model type

- Category: stand growth

- Model level: stand

- Reproduction methods: seedling forest

- Stand structure: even-aged stands

- Species composition: monospecific stands

- Forest origin: natural

Figure 2: Details of *Pinus nigra*

Model requirements and recommended use

- Initial inventory requirements: age, dominant height, basal area and density of the plot

- Geographical area: Castilla y León, closer places and another places with similar characteristics (assuming differences)

- Stand type: monospecific stands

- Execution recommended time: 5 years executions (survival and growth equations developed by using that criteria)

- Site Index is defined as top height at a base age of 50 years
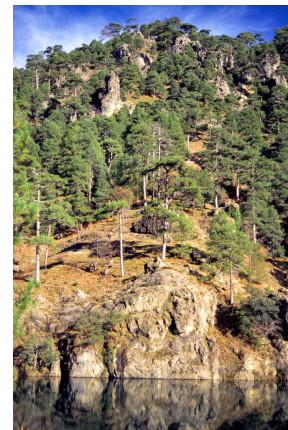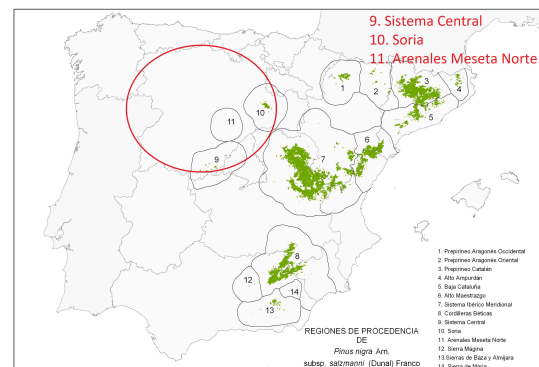

Figure 3: Provenance regions of *Pinus nigra* in Spain

1

Bibliography

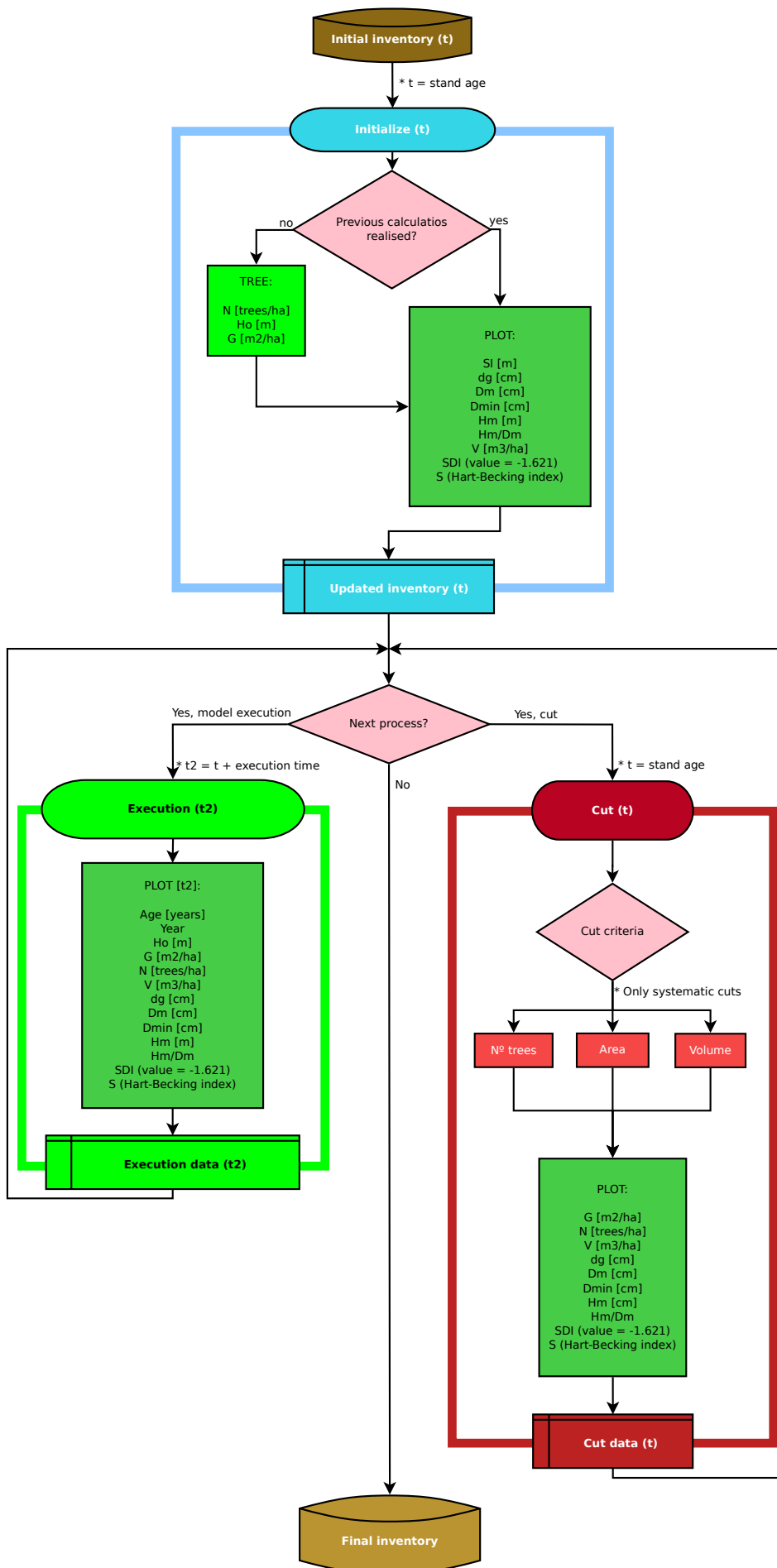**Complete SIMANFOR model recommended citation):**

SIMANFOR (2022). Stand growth model for black pine (*Pinus nigra*) in Castilla and León (Spain).

Model components:

- **Calculations by using tree data** (just in cases when that information is not available at the initial inventory):
  Density, Basal Area and Dominant Height

- **Site Index and Quality Index equations**:
  del Río M, López E, Montero G (2006). Manual de gestión para masas procedentes de repoblación de Pinus pinaster Ait. Pinus sylvestris L. y Pinus nigra Arn. en Castilla y León, 1-102

- **Dominant Height Growth equation**:
  del Río M, López E, Montero G (2006). Manual de gestión para masas procedentes de repoblación de Pinus pinaster Ait. Pinus sylvestris L. y Pinus nigra Arn. en Castilla y León, 1-102

- **Survival equation**:
  Mora JV, del Rio M, Bravo-Oviedo A (2012). Dynamic growth and yield model for Black pine stands in Spain. Forest systems, 21(3), 439-445

- **Growth Basal Area equation**:
  Mora JV, del Rio M, Bravo-Oviedo A (2012). Dynamic growth and yield model for Black pine stands in Spain. Forest systems, 21(3), 439-445

- **Initial and Growth Volume equation**:
  Mora JV, del Rio M, Bravo-Oviedo A (2012). Dynamic growth and yield model for Black pine stands in Spain. Forest systems, 21(3), 439-445

- **Mean Height equation**
  del Río M, López E, Montero G (2006). Manual de gestión para masas procedentes de repoblación de Pinus pinaster Ait. Pinus sylvestris L. y Pinus nigra Arn. en Castilla y León, 1-102

- **Mean Diameter and Minimum Diameter equations**:
  Mora JV, del Rio M, Bravo-Oviedo A (2012). Dynamic growth and yield model for Black pine stands in Spain. Forest systems, 21(3), 439-445

- **Value for Reineke Index equation**:
  del Río M, López E, Montero G (2006). Manual de gestión para masas procedentes de repoblación de Pinus pinaster Ait. Pinus sylvestris L. y Pinus nigra Arn. en Castilla y León, 1-102

- **Quadratic Mean Diameter and Hart Index equation**:
  Standard equations

- **Quadratic Mean Diameter, Hart and Reineke Index equations**:
  Standard equations

- **Harvest equations**:
  Harvest equations developed by using equations mentioned before.

Figures:

- **Figure 1:** Felipe Castilla, website `http://www.arbolapp.es/especies/ficha/pinus-nigra/`

- **Figure 2:** by `https://antropocene.it`

- **Figure 3:** extracted from MAPA

Initial inventory (t)

* t = stand age

Initialize (t)

Previous calculatios realised?

no → TREE:

N [trees/ha]
Ho [m]
G [m2/ha]

yes → PLOT:

SI [m]
dg [cm]
Dm [cm]
Dmin [cm]
Hm [m]
Hm/Dm
V [m3/ha]
SDI (value = -1.621)
S (Hart-Becking index)

Updated inventory (t)

Next process?

Yes, model execution

* t2 = t + execution time

Execution (t2)

PLOT [t2]:

Age [years]
Year
Ho [m]
G [m2/ha]
N [trees/ha]
V [m3/ha]
dg [cm]
Dm [cm]
Dmin [cm]
Hm [m]
Hm/Dm
SDI (value = -1.621)
S (Hart-Becking index)

Execution data (t2)

No

Yes, cut

* t = stand age

Cut (t)

Cut criteria

* Only systematic cuts

Nº trees   Area   Volume

PLOT:

G [m2/ha]
N [trees/ha]
V [m3/ha]
dg [cm]
Dm [cm]
Dmin [cm]
Hm [cm]
Hm/Dm
SDI (value = -1.621)
S (Hart-Becking index)

Cut data (t)

Final inventory

Contacts

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Interest Links

SIMANFOR - Support system for simulating Sustainable Forest Management Alternatives. Accessed 11 May 2021, in `https://www.simanfor.es/`

iuFOR - Sustainable Forest Management Research Institute UVa-INIA. Accessed 11 May 2021, in `http://sostenible.palencia.uva.es/`

ETSIIAA Palencia - Higher Technical School of Agricultural Engineering of Palencia. Accessed 11 May 2021, in `http://etsiiaa.uva.es/`

UVa - University of Valladolid. Accessed 11 May 2021, in `https://www.uva.es`