

## Abstract

This study was conducted to analyze the appropriate tree species and crops according to agroforestry target sites in North Korea based on ecological geography and site properties with the purpose of preparation of technical cooperation on agroforestry, one of the main agendas of the Inter-Korean Forest Cooperation Subcommittee. The agroforestry is one of the methods for forest restoration that satisfies both North Korea's fuel and food shortages and the restoration of deforested land and it began in 2003. To this end, the ecological geographic map (13 regions and 4 zones) of North Korea was made by using satellite images with North Korean journals. The target sites for agroforestry was classified according to 18 site conditions depending on 3 site characteristics (soil depth, relative location, slope), and divided as short-term and long-term target sites depend on agroforestry management period. And then, appropriate tree species and crops for agroforestry are selected according to them. By regions within the same zone, tree species and crops were mostly similar, but compared to each zone, they differed. This seems to be because the geographical climatic characteristics reflected in the ecological geographic map vary greatly from zone to zone. Through this, it is expected to provide information that can be more efficiently implemented through analysis of the target sites needed for application of agroforestry and needed for application of agroforestry management and the combination of suitable species and crops.

## Objective

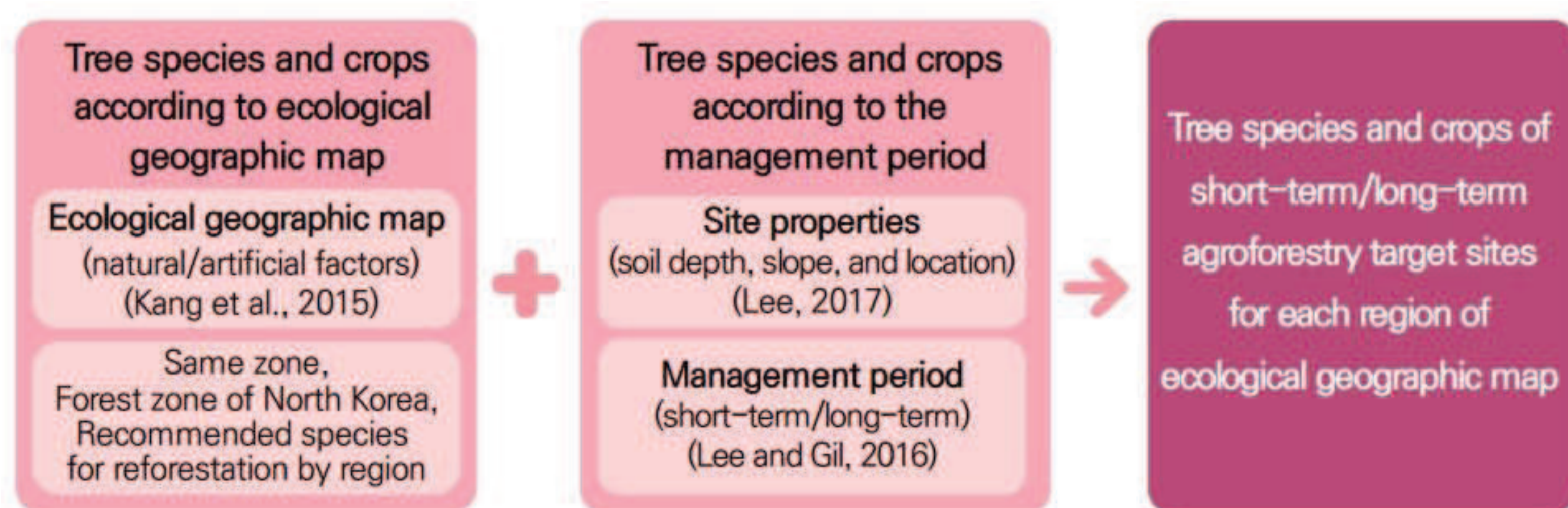
- ❖ This study aims to identify appropriate tree species and crops for agroforestry target sites in North Korea based on ecological geography and site properties.
- ❖ To this end, an ecological geographic map (13 regions and 4 zones) of North Korea was made using satellite images and North Korean academic research articles.

## Materials and Methods

### Material : Research articles about agroforestry in North Korea

1. Lee, Y.H. 2017. A study on the classification method of agroforestry target sites using GIS. Forest Science 4: 11-14.
2. Lee, H.S. and Gil, M.C. 2016. A study on the classification of agroforestry target sites of major economic tree species. Forest Science 2: 7-15.
3. Ju, S.J., Kang, J.J. and Kim, Y.C. 2012. A study on ecological geographic map of North Korea. Geological and Geographical Science 2: 48-49.
4. Kang, J.J., Ju, S.J. and Hong, Y.I. 2015. A study on the reasonable determination of type of agroforestry. Geological and Geographical Science 3: 38-40.

### Method : Analyzing the suitable tree species and crops for agroforestry of 2 categories in 4 zones 13 regions according to site condition, management period, and ecological geography in North Korea



**<Figure 1> Method for selecting tree species and crop according to management period of each ecological geographic area.**

- ① The 2 categories of trees and crops were selected considering 18 site conditions and 2 management periods
  - ※ Category 1 (12 site conditions) and Category 2 (6 site conditions)
- ② Tree species and crops were selected considering ecological geography in 4 zones and 13 regions
- ③ Finally, analysis of the suitable tree species and crops for agroforestry of 2 categories in 4 zones and 13 regions through data integration

### Reference

- SDC, ICRAF, and MoLEP. 2011. Participatory Agroforestry Development in DPR Korea. (book in North Korea)
- SDC. 2010. Sloping Land Management in DPR Korea-Partnership Results (Asia Brief | Food from the Hills).
- Park et al. 2021. A study on appropriate tree species and crops for agroforestry using an ecological geographic map of North Korea. Journal of Korean Society and Science 110(3): 355-368.

## Results

- ❖ Tree species and crops of agroforestry considering both the site condition and ecological geography in North Korea.

**<Table 1>**

\*English name (North Korean name)

Zone	Region	Short-term target site		Long-term target site	
		Tree species	Crop	Tree species	Crop
Northern highland	Baekdu highland	Siberian elm(비슬나무), Korean spruce(송비나무), Dahurian larch(이갈나무), Dark-bark spruce(기문비나무), Khingan fir(문비나무), Needle fir(진나무)	potato (감자), bean(콩)	Yellow horn(기름방나무), Ussuri pear(산돌배나무)	millet(기장), buckwheat(메밀), faba bean(보라콩), wheat(밀), barley(보리)
	Samsu-Gabsan	Siberian elm(비슬나무), Korean spruce(송비나무), Japanese larch(창성이갈나무), Dahurian larch(이갈나무), Dark-bark spruce(기문비나무), Khingan fir(문비나무), Needle fir(진나무)	potato (감자)	Yellow horn(기름방나무), Ussuri pear(산돌배나무)	millet(기장), mung bean(녹두), perilla seed(들깨), buckwheat(메밀), wheat(밀), faba bean(보라콩), sesame seed(참깨), barley(보리), pea(완두), italian millet(조), red bean(팥)
	Kimhyung-gwon-Pungseo	Korean pine(잣나무), Siberian elm(비슬나무), Korean spruce(송비나무), Japanese larch(창성이갈나무), Dahurian larch(이갈나무), Dark-bark spruce(기문비나무), Khingan fir(문비나무), Needle fir(진나무)	potato (감자)	Yellow horn(기름방나무), Ussuri pear(산돌배나무)	millet(기장), mung bean(녹두), perilla seed(들깨), buckwheat(메밀), wheat(밀), faba bean(보라콩), sesame seed(참깨), barley(보리), pea(완두), italian millet(조), red bean(팥)
Inland mountainous	Jagang Mountainous	Korean pine(잣나무), Manchurian walnut(가래나무), Siberian elm(비슬나무), Korean spruce(송비나무), Japanese larch(창성이갈나무), Dahurian larch(이갈나무), Dark-bark spruce(기문비나무), Khingan fir(문비나무), Needle fir(진나무)	potato (감자)	Yellow horn(기름방나무), Ussuri pear(산돌배나무)	millet(기장), mung bean(녹두), perilla seed(들깨), buckwheat(메밀), wheat(밀), faba bean(보라콩), sesame seed(참깨), barley(보리), pea(완두), italian millet(조), red bean(팥)
	Bukdaebong Mountainous	Korean Evodia(수유나무), Manchurian walnut(가래나무), Korean castanea(밤나무), Siberian elm(비슬나무), Black Locust(아카시아나무), Mountain Hawthorn(활강이나무), Manchurian poplar(황철나무), Manchurian alder(물오리나무), Japanese larch(창성이갈나무), Amur linden(파나무)	sweet potato (고구마), potato (감자)	Yellow horn(기름방나무), Fragrant snowbell(옥동백나무), Aronia(단나무), Apricot(살구나무), Ussuri pear(산돌배나무), Indigobush Amorpha(괘비리), Paper mulberry(닥나무)	corn(감자), millet(기장), mung bean(녹두), perilla seed(들깨), buckwheat(메밀), wheat(밀), kidney bean(팥), climbing bean(줄콩), sesame seed(참깨), barley(보리), sorghum(수수), pea(완두), italian millet(조), red bean(팥)
	Pyeonggang - Saepo Plateau	Korean pine(잣나무), Manchurian walnut(가래나무), Korean castanea(밤나무), Siberian elm(비슬나무), Black Locust(아카시아나무), Mountain Hawthorn(활강이나무), Manchurian poplar(황철나무), Manchurian alder(물오리나무), Japanese larch(창성이갈나무), Dahurian larch(이갈나무), Amur linden(파나무)	sweet potato (고구마), potato (감자), upland rice(밭벼)	Yellow horn(기름방나무), Fragrant snowbell(옥동백나무), Blunt-lobe spicebush(생강나무), Aronia(단나무), Apricot(살구나무), Ussuri pear(산돌배나무), Indigobush Amorpha(괘비리), Paper mulberry(닥나무)	corn(감자), millet(기장), mung bean(녹두), perilla seed(들깨), buckwheat(메밀), wheat(밀), kidney bean(팥), climbing bean(줄콩), sesame seed(참깨), barley(보리), sorghum(수수), pea(완두), italian millet(조), red bean(팥)
West coast	Northern coast	Persian walnut(호두나무), Korean Evodia(수유나무), Heart-shape walnut(쪽가래나무), Korean pine(잣나무), Manchurian walnut(가래나무), Korean castanea(밤나무), Eucommia(두충나무), Siberian elm(비슬나무), Black Locust(아카시아나무), Mountain Hawthorn(활강이나무), Manchurian poplar(황철나무), Manchurian alder(물오리나무), Japanese larch(창성이갈나무), Amur linden(파나무), East Asian alder(오리나무)	sweet potato (고구마), potato (감자), upland rice(밭벼)	Yellow horn(기름방나무), Fragrant snowbell(옥동백나무), Blunt-lobe spicebush(생강나무), Aronia(단나무), Apricot(살구나무), Ussuri pear(산돌배나무), Indigobush Amorpha(괘비리), Paper mulberry(닥나무)	corn(감자), millet(기장), mung bean(녹두), perilla seed(들깨), buckwheat(메밀), wheat(밀), kidney bean(팥), climbing bean(줄콩), sesame seed(참깨), barley(보리), sorghum(수수), pea(완두), italian millet(조), red bean(팥)
	Central coast	Persian walnut(호두나무), Korean Evodia(수유나무), Heart-shape walnut(쪽가래나무), Korean pine(잣나무), Manchurian walnut(가래나무), Korean castanea(밤나무), Eucommia(두충나무), Siberian elm(비슬나무), Black Locust(아카시아나무), Mountain Hawthorn(활강이나무), Manchurian poplar(황철나무), Manchurian alder(물오리나무), Japanese larch(창성이갈나무), Amur linden(파나무), East Asian alder(오리나무)	sweet potato (고구마), potato (감자), upland rice(밭벼)	Yellow horn(기름방나무), Fragrant snowbell(옥동백나무), Blunt-lobe spicebush(생강나무), Aronia(단나무), Apricot(살구나무), Ussuri pear(산돌배나무), Indigobush Amorpha(괘비리), Paper mulberry(닥나무)	corn(감자), millet(기장), mung bean(녹두), perilla seed(들깨), buckwheat(메밀), wheat(밀), kidney bean(팥), climbing bean(줄콩), sesame seed(참깨), barley(보리), sorghum(수수), pea(완두), italian millet(조), red bean(팥)
	Southern coast	Persian walnut(호두나무), Korean Evodia(수유나무), Heart-shape walnut(쪽가래나무), Korean pine(잣나무), Manchurian walnut(가래나무), Korean castanea(밤나무), Eucommia(두충나무), Siberian elm(비슬나무), Black Locust(아카시아나무), Mountain Hawthorn(활강이나무), Manchurian poplar(황철나무), Manchurian alder(물오리나무), Japanese larch(창성이갈나무), Amur linden(파나무), East Asian alder(오리나무)	sweet potato (고구마), potato (감자), upland rice(밭벼)	Yellow horn(기름방나무), Fragrant snowbell(옥동백나무), Blunt-lobe spicebush(생강나무), Aronia(단나무), Apricot(살구나무), Ussuri pear(산돌배나무), Indigobush Amorpha(괘비리), Paper mulberry(닥나무)	corn(감자), millet(기장), mung bean(녹두), perilla seed(들깨), buckwheat(메밀), wheat(밀), kidney bean(팥), climbing bean(줄콩), sesame seed(참깨), barley(보리), sorghum(수수), pea(완두), italian millet(조), red bean(팥)
East coast	Northeast	Korean pine(잣나무), Manchurian walnut(가래나무), Siberian elm(비슬나무), Korean spruce(송비나무), Dahurian larch(이갈나무), Japanese larch(창성이갈나무), Dark-bark spruce(기문비나무), Khingan fir(문비나무), Needle fir(진나무)	sweet potato (고구마), potato (감자)	Yellow horn(기름방나무), Aronia(단나무), Apricot(살구나무), Ussuri pear(산돌배나무)	corn(감자), millet(기장), mung bean(녹두), perilla seed(들깨), buckwheat(메밀), wheat(밀), kidney bean(팥), climbing bean(줄콩), sesame seed(참깨), barley(보리), sorghum(수수), pea(완두), italian millet(조), red bean(팥)
	Dancheon-Bukcheong	Manchurian walnut(가래나무), Siberian elm(비슬나무), Black Locust(아카시아나무), Manchurian poplar(황철나무), Manchurian alder(물오리나무), Japanese larch(창성이갈나무), Amur linden(파나무)	sweet potato (고구마), potato (감자), upland rice(밭벼)	Yellow horn(기름방나무), Aronia(단나무), Apricot(살구나무), Ussuri pear(산돌배나무), Indigobush Amorpha(괘비리)	corn(감자), millet(기장), mung bean(녹두), perilla seed(들깨), buckwheat(메밀), wheat(밀), kidney bean(팥), climbing bean(줄콩), sesame seed(참깨), barley(보리), sorghum(수수), pea(완두), italian millet(조), red bean(팥)
	Hamheung-Geumya	Manchurian walnut(가래나무), Siberian elm(비슬나무), Black Locust(아카시아나무), Manchurian poplar(황철나무), Manchurian alder(물오리나무), Japanese larch(창성이갈나무), Amur linden(파나무)	sweet potato (고구마), potato (감자), upland rice(밭벼)	Yellow horn(기름방나무), Aronia(단나무), Apricot(살구나무), Ussuri pear(산돌배나무), Indigobush Amorpha(괘비리)	corn(감자), millet(기장), mung bean(녹두), perilla seed(들깨), buckwheat(메밀), wheat(밀), kidney bean(팥), climbing bean(줄콩), sesame seed(참깨), barley(보리), sorghum(수수), pea(완두), italian millet(조), red bean(팥)
Wonsan-Goseong	Korean pine(잣나무), Manchurian walnut(가래나무), Manchurian poplar(황철나무), Manchurian alder(물오리나무), Japanese larch(창성이갈나무), Amur linden(파나무)	sweet potato (고구마), potato (감자), upland rice(밭벼)	Yellow horn(기름방나무), Aronia(단나무), Apricot(살구나무), Ussuri pear(산돌배나무), Indigobush Amorpha(괘비리)	corn(감자), millet(기장), mung bean(녹두), perilla seed(들깨), buckwheat(메밀), wheat(밀), kidney bean(팥), climbing bean(줄콩), barley(보리), sorghum(수수), pea(완두), italian millet(조), red bean(팥)	