



Growth of three oak species on an agroforestry watershed

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Introduction

- Agroforestry systems have been identified as environmentally beneficial, alternative systems for agricultural production in temperate North America.
- Agroforestry practices using proper tree species and management practices can optimize resource sharing between the tree and crop component.
- Selection of site and climate suitable tree species is vital in achieving production, environmental, and economic benefits of agroforestry.

Objectives

Examine the growth of three selected oak species established in an agroforestry practice designed for watershed protection to find the best species which provides optimum benefits.

Materials and Methods

- Study site - Lee Greenley Jr. Memorial Research Center of the University of Missouri-Columbia, Knox County, Missouri, USA (Fig. 1), a 4.44 ha watershed under corn-soybean rotation with agroforestry buffers (Fig. 1).
- Tree buffer establishment - November 1997. (Six tree buffers, 334 trees, three tree species).
 - Pin oak (*Quercus palustris* Muenchh.) (PO) - 111
 - Swamp white oak (*Q. bicolor* Willd.) (SWO) - 112
 - Bur oak (*Q. macrocarpa* Michx.) (BO) - 111
- Three tree growth parameters were measured during 1999 – 2021 period, which were tree height, Diameter at breast height (DBH), and Diameter at 10 cm height (Dia 10).

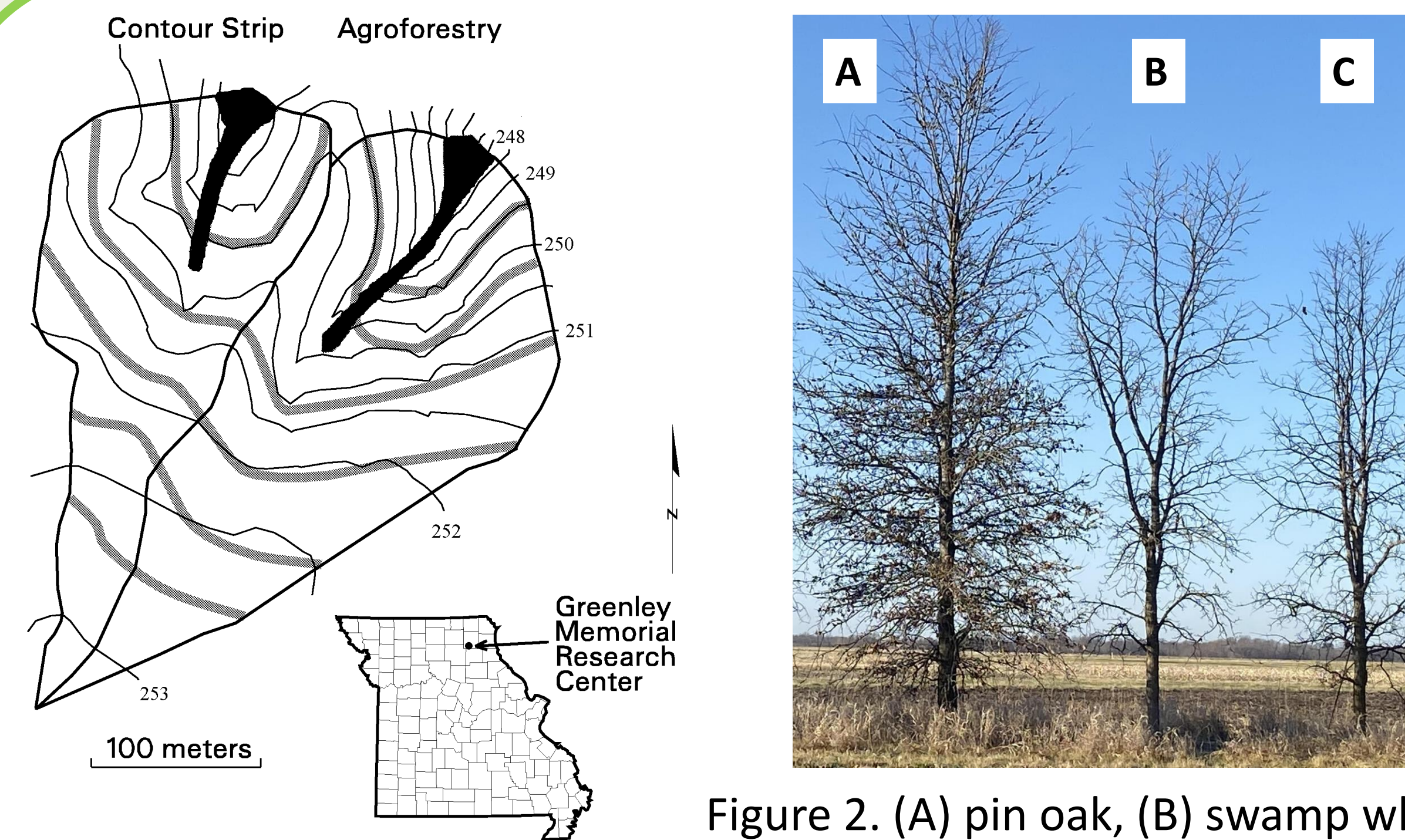


Figure 1. Location of study site.

Figure 2. (A) pin oak, (B) swamp white oak, and (C) bur oak trees in 2021 spring.

Results and Discussion

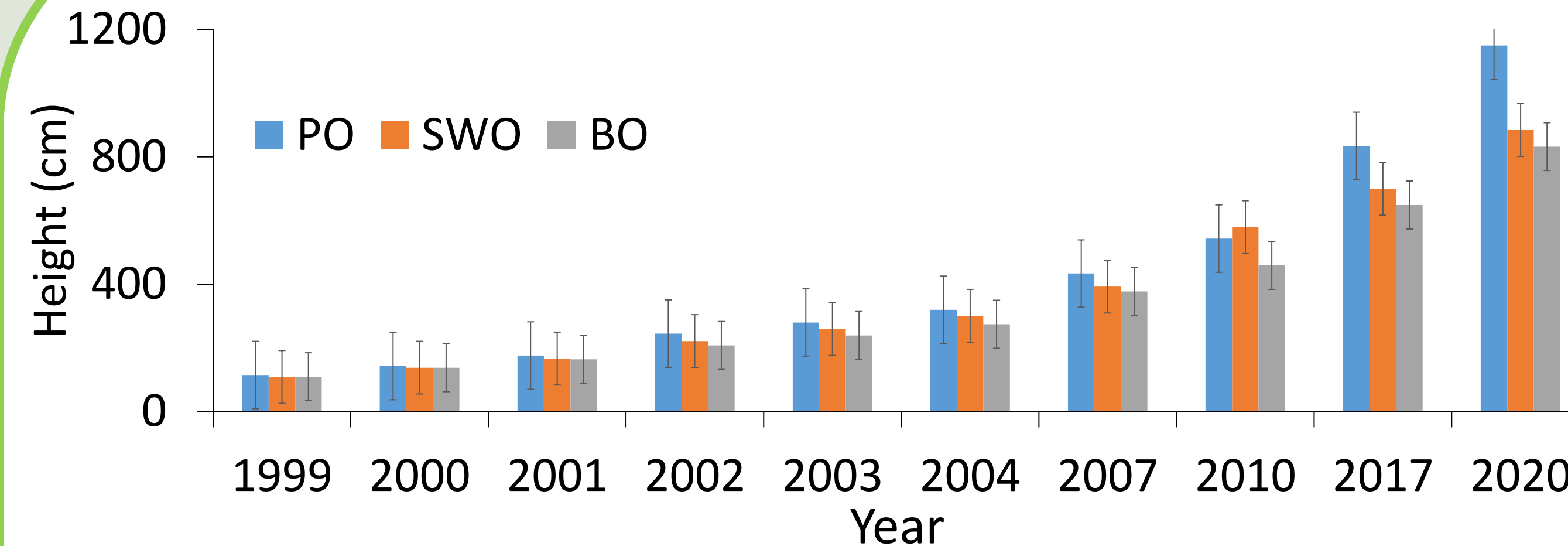


Figure 3. Height growth of trees from 1999 to 2020

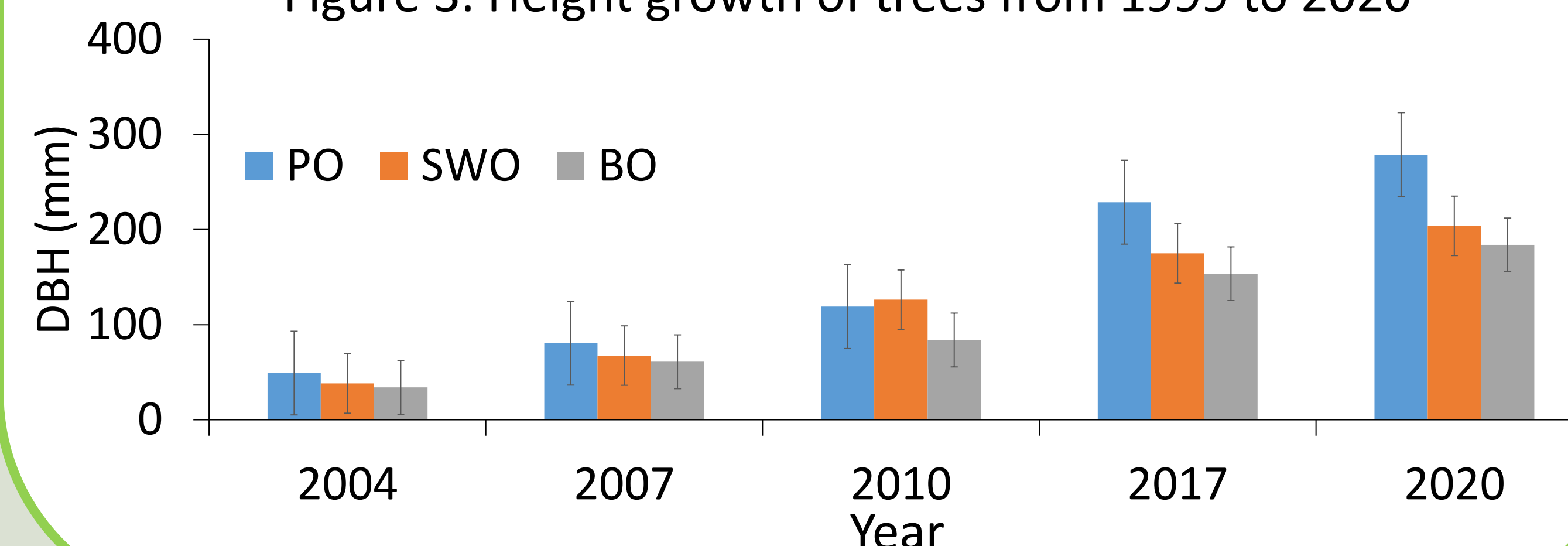


Figure 4. DBH growth of trees from 2004 to 2020

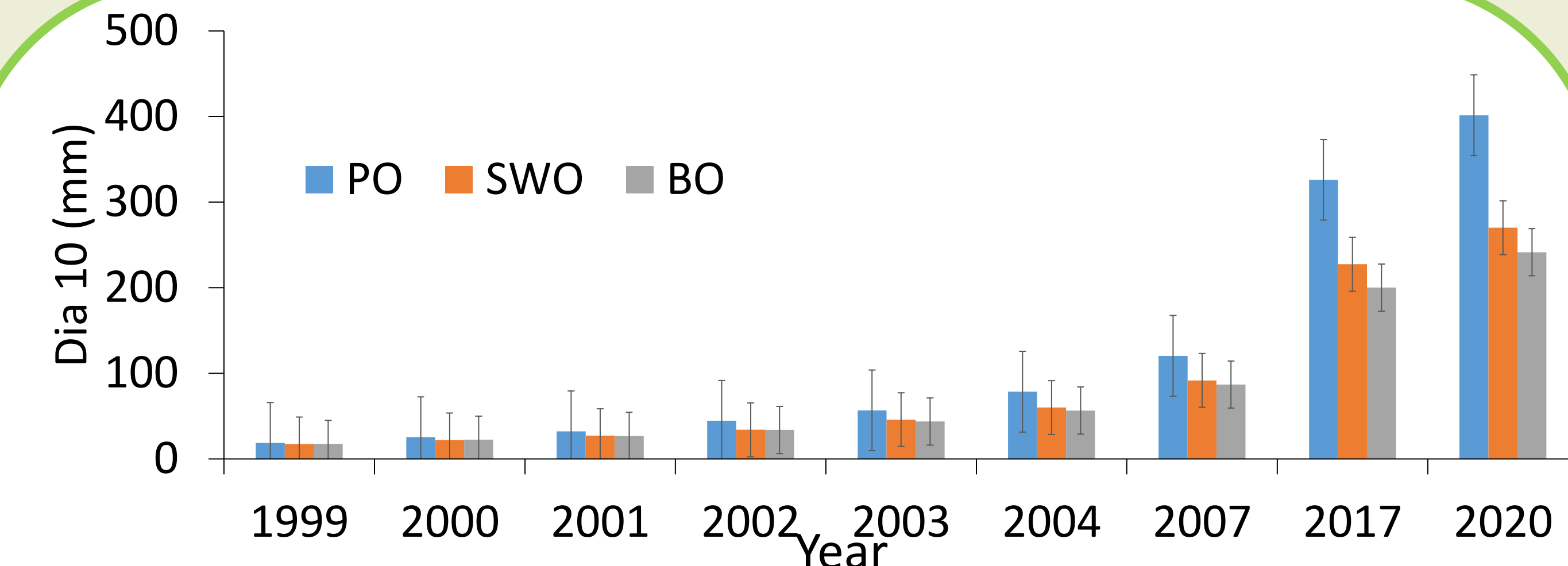


Figure 5. Diameter at 10 cm (Dia 10) growth of trees from 1999 to 2020

- Tree height (Fig. 3)
 - 1999, 2000 – no significant differences.
 - Except 2010, from 2001 – 2020 – PO > SWO > BO
- DBH (Fig. 4)
 - 2004 – PO > SWO, BO
 - 2010 – PO, SWO > BO
 - 2007, 2017, 2020 – PO > SWO > BO
- Dia 10 (Fig. 5)
 - 1999 – 2007 – PO > SWO, BO
 - 2017, 2020 – PO > SWO > BO

Conclusions

- From 2001 onwards, PO dominated SWO and BO in tree height, DBH, and Dia 10.
- Greater plant growth is an indication of increased ability of providing environmental benefits.
- PO is the most suited species out of the three tree species in providing optimum production, environmental, and economic benefits to the watershed.

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Work Cited.

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