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## **Italian hybrid poplar clones with greater environmental sustainability**

**PIERMARIA CORONA, SARA BERGANTE, GAETANO CASTRO, PIER MARIO  
CHIARABAGLIO, DOMENICO COALOA, GIANNI FACCIOTTO, MASSIMO GENNARO,  
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## **ITALIAN HYBRID POPLAR CLONES WITH GREATER ENVIRONMENTAL SUSTAINABILITY**

Publication produced through the contribution of the Consiglio per la ricerca in agricoltura e l'analisi dell'economia agraria (Italian Council for Agricultural Research and Economics, CREA) and Rete Rurale Nazionale (Italian National Rural Network, RRN).

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# CONTENTS

## 1. INTRODUCTION

## 2. INFORMATION SHEETS FOR ITALIAN HYBRID POPLAR CLONES WITH GREATER ENVIRONMENTAL SUSTAINABILITY (“MSA” CLONES)

- ❖ *I-214 (for comparison)*
- ❖ AF8
- ❖ ALERAMO
- ❖ BRENTA
- ❖ DIVA
- ❖ DVINA
- ❖ ERIDANO
- ❖ HARVARD
- ❖ LAMBRO
- ❖ LENA
- ❖ LUX
- ❖ MELLA
- ❖ MOLETO
- ❖ MOMBELLO
- ❖ MONCALVO
- ❖ OGLIO
- ❖ ONDA
- ❖ SAN MARTINO
- ❖ SENNA
- ❖ SILE
- ❖ SOLIGO
- ❖ STURA
- ❖ TARO
- ❖ TUCANO
- ❖ VILLAFRANCA





## 1. INTRODUCTION

Poplar cultivation in Italy and many other countries is widely based on the use of the *P. ×canadensis* clone 'I-214', which is characterized by great adaptability to different climate and soil conditions, ideal wood characteristics for the manufacture of plywood panels (light weight, colour) but also by susceptibility to a few biotic threats (woolly aphid, rusts, Marssonina leaf spot).

The availability of new clones selected by the Italian Council for Agricultural Research and Economics (CREA) offering greater environmental sustainability (Maggiore Sostenibilità Ambientale in Italian, thus referred to as **MSA** clones) characterized by better resistance to the main biotic adversities, has aroused high interest and makes it possible to develop cultivation models that, by minimizing cultural practice and disease and pest control interventions, allow for more environmentally sustainable poplar cultivation. The process of wood peeling for these MSA clones is substantially identical to that for 'I-214', even if their technological characteristics may require the industry to adjust its processing methods.

The information sheets of the MSA poplar clones are shown on the following pages.

*For comparison, the technical sheet of 'I-214' is also reported, though not belonging to the MSA group.*

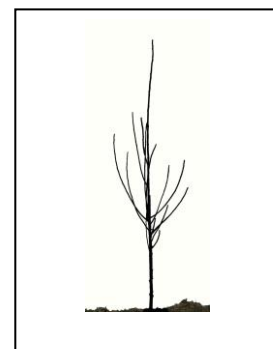
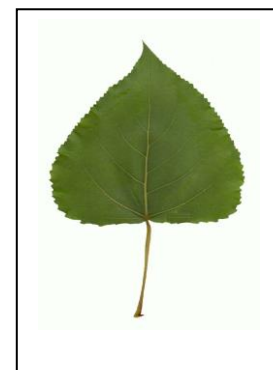


**2. INFORMATION SHEETS FOR 'MSA' CLONES**



IDENTITY CARD**Species:** *Populus ×canadensis* Moench**Mother:** *P. ×canadensis* 'Canadese bianco' (Pinerolo - TO, Italy)**Father:** *Populus deltoides* W. Bartram ex Marshall 'Caroliniano prodigioso' (Pinerolo - TO, Italy)**Sex:** female**Breeder:** Giovanni Jacometti, Istituzione per il Miglioramento del Pioppo, Villafranca Piemonte (TO) and Istituto di Sperimentazione per la Pioppicoltura, Casale Monferrato (AL), ItalyMORPHOLOGICAL PROPERTIES**Phenotype:** similar to *Populus ×canadensis***Crown width:** slightly spreading**Leaf colour:** brown at budburst, green when mature**Leaf-bud colour:** reddish-brown**Leaf budburst date:** medium to early**Adult stem shape:** slightly sinuous, cylindrical**Bark:** smooth, gray in colour**Wood:** basic density 0.29 g/cm<sup>3</sup>RESISTANCE TO THE MAIN BIOTIC ADVERSITIES

	Very low	Low	Moderate	High	Very high
<i>Venturia populina</i>					
<i>Melampsora</i> spp.					
<i>Marssonina brunnea</i>					
<i>Discosporium populeum</i>					
Brown spots					
Poplar Mosaic Virus					
<i>Phloeomyzus passerinii</i>					

GROWTH AND PRODUCTION PROPERTIES**Suitability for vegetative propagation:** very good capacity of cuttings to form roots, very good rooting of saplings**Soil:** suitable for various types of soil**Planting period:** during the period of vegetative dormancy**Pruning:** very easy**Growth:** steady, relatively slow in the juvenile phase**Production:** 20 m<sup>3</sup> per hectare per year in the Po Valley plain, with planting density of 280-330 plants per hectare.

IDENTITY CARD

**Species:** interspecific hybrid

**Mother:** *Populus ×generosa* Henry ‘103-86’

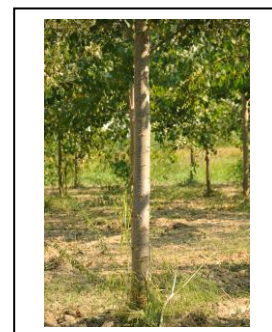
**Father:** *Populus trichocarpa* Torr. & Gray ‘PEE’ (Washington, USA)

**Sex:** female

**Breeder:** Alasia Franco (Savigliano - CN, Italy)

**Community Plant Variety Right (CPVR) grant n°:** EU 27376

**CPVR Grant Owner:** Alasia Corrado – Alasia Franco - Alasia Gianfranco



MORPHOLOGICAL PROPERTIES

**Phenotype:** similar to *Populus ×generosa*

**Crown width:** slightly spreading

**Leaf colour:** reddish at budburst

**Leaf-bud colour:** reddish-brown

**Leaf budburst date:** medium

**Adult stem shape:** cylindrical, straight

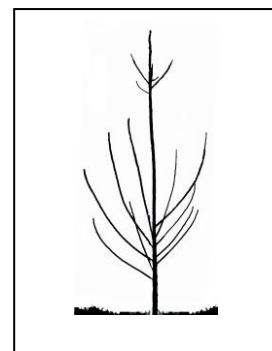
**Bark:** light gray in colour

**Wood:** basic density 0.32 g/cm<sup>3</sup>



RESISTANCE TO THE MAIN BIOTIC ADVERSITIES

	Very low	Low	Moderate	High	Very high
<i>Venturia populina</i>					
<i>Melampsora</i> spp.					
<i>Marssonina brunnea</i>					
<i>Discosporium populeum</i>					
Brown spots					
Poplar Mosaic Virus					
<i>Phloeomyzus passerinii</i>					



GROWTH AND PRODUCTION PROPERTIES

**Suitability for vegetative propagation:** very good capacity of cuttings to form roots; very good rooting of saplings

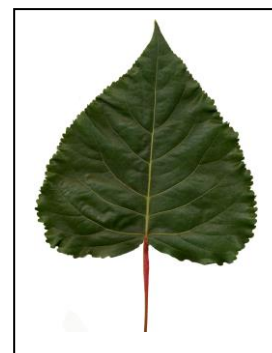
**Soil:** suitable for loose soils

**Planting period:** winter

**Pruning:** easy; selective pruning is required during the first 3-4 years

**Growth:** fast during the whole rotation

**Production:** superior to that of ‘I-214’



## IDENTITY CARD

**Species:** *Populus ×canadensis* Moench

**Mother:** *Populus deltoides* W: Bartram ex Marshall ‘D0-006’ (Texas, USA)

**Father:** *Populus nigra* L. ‘N083’ (Rosignano Monferrato - AL, Italy)

**Sex:** male

**Breeder:** (CREA-PLF) Consiglio per la ricerca in agricoltura e l’analisi dell’economia agraria – Unità di ricerca per le produzioni legnose fuori foresta

**Community Plant Variety Right (CPVR) grant n°:** EU 38492

**CPVR Grant Owner:** Consiglio per la ricerca in agricoltura e l’analisi dell’economia agraria (CREA)



## MORPHOLOGICAL PROPERTIES

**Phenotype:** similar to *Populus ×canadensis*

**Crown width:** slightly spreading

**Leaf colour:** brown at budburst, green when fully extended

**Leaf-bud colour:** reddish-brown

**Leaf budburst date:** early

**Adult stem shape:** straight, cylindrical

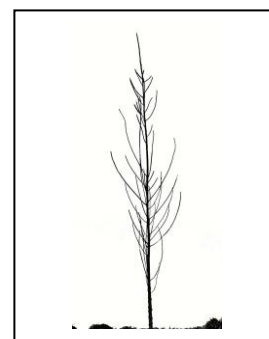
**Bark:** generally smooth, light gray in colour

**Wood:** basic density 0.32 g/cm<sup>3</sup>



## RESISTANCE TO THE MAIN BIOTIC ADVERSITIES

	Very low	Low	Moderate	High	Very high
<i>Venturia populina</i>					
<i>Melampsora</i> spp.					
<i>Marssonina brunnea</i>					
<i>Discosporium populeum</i>					
Brown spots					
Poplar Mosaic Virus					
<i>Phloeomyzus passerinii</i>					



## GROWTH AND PRODUCTION PROPERTIES

**Suitability for vegetative propagation:** good capacity of cuttings to form roots, very good rooting of saplings

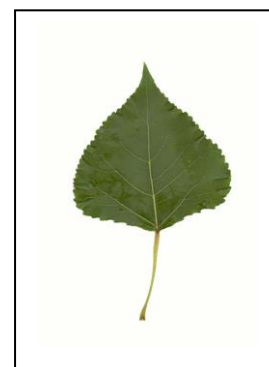
**Soil:** grows better on loose soils

**Planting period:** during the period of vegetative dormancy

**Pruning:** easy; shaping pruning is necessary during the first years

**Growth:** quite fast in the juvenile period, steady afterwards

**Production:** generally superior to that of ‘I-214’



## IDENTITY CARD

**Species:** *Populus ×canadensis* Moench

**Mother:** *Populus deltoides* W. Bartram ex Marshall ‘Chautagne’ (Francia)

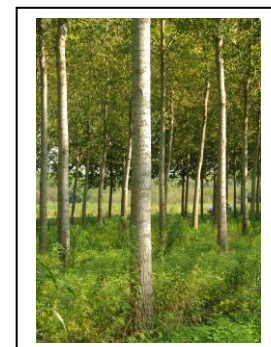
**Father:** *Populus nigra* L. ‘Type 1’ (Grecia)

**Sex:** female

**Breeder:** Lapietra Gianfranco (CREA.PLF)

**Community Plant Variety Right (CPVR) grant n°:** EU 13688

**CPVR Grant Owner:** Consiglio per la ricerca in agricoltura e l’analisi dell’economia agraria (CREA)



## MORPHOLOGICAL PROPERTIES

**Phenotype:** similar to *Populus ×canadensis*

**Crown width:** narrow

**Leaf colour:** reddish-violet at budburst, dark green when mature

**Leaf-bud colour:** brown

**Leaf budburst date:** medium (slightly later than ‘I-214’)

**Adult stem shape:** straight, cylindrical

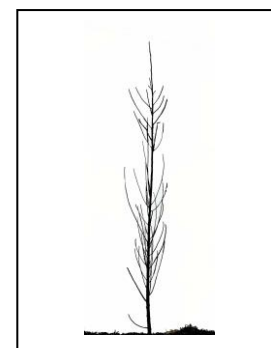
**Bark:** rough, brown in colour

**Wood:** basic density 0.35 g/cm<sup>3</sup>



## RESISTANCE TO THE MAIN BIOTIC ADVERSITIES

	Very low	Low	Moderate	High	Very high
<i>Venturia populina</i>					
<i>Melampsora</i> spp.					
<i>Marssonina brunnea</i>					
<i>Discosporium populeum</i>					
Brown spots					
Poplar Mosaic Virus					
<i>Phloeomyzus passerinii</i>					



## GROWTH AND PRODUCTION PROPERTIES

**Suitability for vegetative propagation:** good capacity of cuttings to form roots, very good rooting of saplings

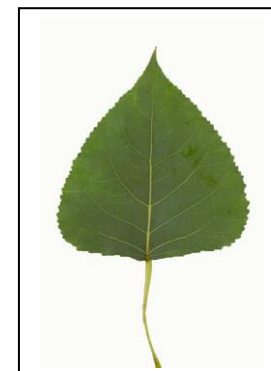
**Soil:** suitable for various types of soil, including clay and slightly calcareous soils

**Planting period:** during the period of vegetative dormancy

**Pruning:** easy; tends to form epicormic branches

**Growth:** fast, especially in the juvenile phase

**Production:** very high, generally superior to that of ‘I-214’



IDENTITY CARD

**Species:** *Populus ×canadensis* Moench

**Mother:** *Populus deltoides* W. Bartram ex Marshall ‘D0-006’ (Texas, USA)

**Father:** *Populus nigra* L. (polycross)

**Sex:** female

**Breeder:** (CREA-PLF) Consiglio per la ricerca in agricoltura e l’analisi dell’economia agraria – Unità di ricerca per le produzioni legnose fuori foresta

**Community Plant Variety Right (CPVR) grant n°:** EU 38690

**CPVR Grant Owner:** Consiglio per la ricerca in agricoltura e l’analisi dell’economia agraria (CREA)



MORPHOLOGICAL PROPERTIES

**Phenotype:** similar to *Populus ×canadensis*

**Crown width:** spreading

**Leaf colour:** brown at budburst

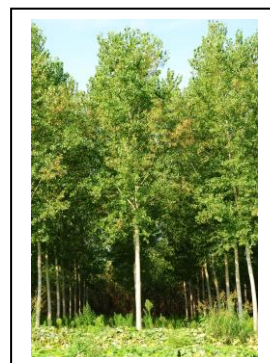
**Leaf-bud colour:** reddish-brown

**Leaf budburst date:** medium to late

**Adult stem shape:** straight, cylindrical

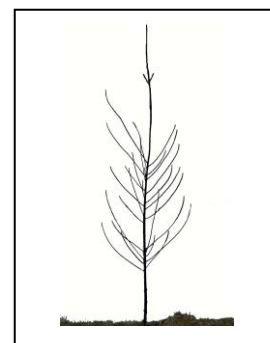
**Bark:** generally smooth, light gray in colour

**Wood:** basic density 0.31 g/cm<sup>3</sup>



RESISTANCE TO THE MAIN BIOTIC ADVERSITIES

	Very low	Low	Moderate	High	Very high
<i>Venturia populina</i>				High	
<i>Melampsora</i> spp.					Very high
<i>Marssonina brunnea</i>					Very high
<i>Discosporium populeum</i>				High	
Brown spots				High	
Poplar Mosaic Virus				High	
<i>Phloeomyzus passerinii</i>					Very high



GROWTH AND PRODUCTION PROPERTIES

**Suitability for vegetative propagation:** good capacity of cuttings to form roots, very good rooting of saplings

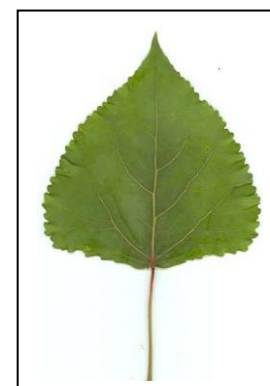
**Soil:** grows better on loose soils

**Planting period:** during the period of vegetative dormancy

**Pruning:** quite easy; frequent and timely operations are required

**Growth:** quite fast in the juvenile period, steady afterwards

**Production:** generally superior to that of ‘I-214’, particularly on loose soils





IDENTITY CARD

**Species:** *Populus deltoides* W. Bartram ex Marshall  
**Mother:** *P. deltoides* '55-083' (Kansas, USA)  
**Father:** free *in-situ* pollination (Casale Monferrato - AL, Italy)  
**Sex:** male  
**Breeder:** Lapietra Gianfranco (Società Agricola Forestale- SAF)



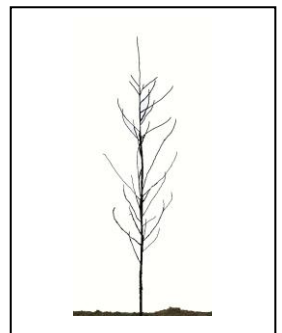
MORPHOLOGICAL PROPERTIES

**Phenotype:** similar to *Populus deltoides*  
**Crown width:** spreading  
**Leaf colour:** brown at budburst, light green when mature  
**Leaf-bud colour:** reddish-brown  
**Leaf budburst date:** medium to late  
**Adult stem shape:** straight and cylindrical  
**Bark:** rough, light in colour  
**Wood:** basic density 0.33 g/cm<sup>3</sup>



RESISTANCE TO THE MAIN BIOTIC ADVERSITIES

	Very low	Low	Moderate	High	Very high
<i>Venturia populina</i>					
<i>Melampsora</i> spp.					
<i>Marssonina brunnea</i>					
<i>Discosporium populeum</i>					
Brown spots					
Poplar Mosaic Virus					
<i>Phloeomyzus passerinii</i>					



GROWTH AND PRODUCTION PROPERTIES

**Suitability for vegetative propagation:** good capacity of cuttings to form roots, good rooting of saplings  
**Soil:** also suitable for dry and heavy soils  
**Planting period:** usually in winter  
**Pruning:** quite demanding; requires timely and frequent shaping interventions  
**Growth:** fast and steady  
**Production:** superior to that of 'I-214'



## IDENTITY CARD

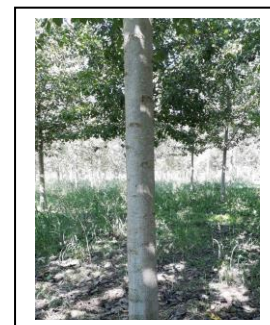
**Species:** interspecific hybrid

**Mother:** *Populus deltoides* W. Bartram ex Marshall ‘I-37’

**Father:** *Populus maximowiczii* Henry (Hokkaido, Giappone)

**Sex:** male

**Breeder:** (CREA-PLF) Consiglio per la ricerca in agricoltura e l’analisi dell’economia agraria – Unità di ricerca per le produzioni legnose fuori foresta



## MORPHOLOGICAL PROPERTIES

**Phenotype:** not similar to any well-defined type

**Crown width:** spreading

**Leaf colour:** light green at budburst

**Leaf-bud colour:** reddish-green

**Leaf budburst date:** very early

**Adult stem shape:** straight or slightly sinuous, oval cross-section, with buttresses at the base

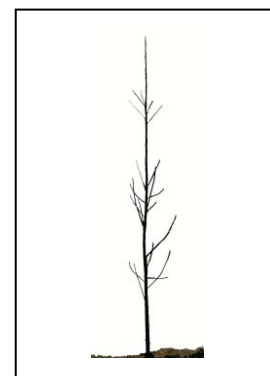
**Bark:** smooth, gray in colour

**Wood:** basic density 0.31 g/cm<sup>3</sup>



## RESISTANCE TO THE MAIN BIOTIC ADVERSITIES

	Very low	Low	Moderate	High	Very high
<i>Venturia populina</i>					
<i>Melampsora</i> spp.					
<i>Marssonina brunnea</i>					
<i>Discosporium populeum</i>					
Brown spots					
Poplar Mosaic Virus					
<i>Phloeomyzus passerinii</i>					



## GROWTH AND PRODUCTION PROPERTIES

**Suitability for vegetative propagation:** good; very good rooting of saplings

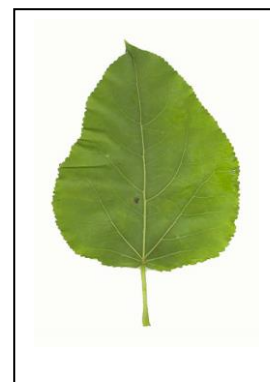
**Soil:** only suitable for loose and deep soils, suffers from the presence of active calcium carbonate

**Planting period:** during the period of vegetative dormancy

**Pruning:** requires accurate shaping interventions

**Growth:** fast

**Production:** potentially high, generally superior to that of ‘I-214’, with irregularity of the stem cross-sections. It can be appreciated for ornamental purposes and biomass productions.



## IDENTITY CARD

**Species:** *Populus deltoides* W. Bartram ex Marshall

**Mother:** *P. deltoides* var. 'Missouriensis'

**Father:** free *in-situ* pollination (Stoneville, Mississippi, USA)

**Sex:** male

**Breeder:** Istituto di Sperimentazione per la Pioppicoltura  
(Casale Monferrato - AL, Italy)



## MORPHOLOGICAL PROPERTIES

**Phenotype:** similar to *Populus deltoides*

**Crown width:** spreading

**Leaf colour:** dark green

**Leaf-bud colour:** brown

**Leaf budburst date:** medium to late

**Adult stem shape:** straight and quite cylindrical

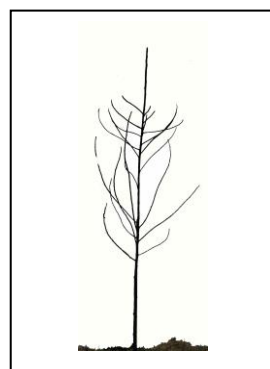
**Bark:** gray, marked suberose ridges

**Wood:** basic density 0.32 g/cm<sup>3</sup>



## RESISTANCE TO THE MAIN BIOTIC ADVERSITIES

	Very low	Low	Moderate	High	Very high
<i>Venturia populina</i>					
<i>Melampsora</i> spp.					
<i>Marssonina brunnea</i>					
<i>Discosporium populeum</i>					
Brown spots					
Poplar Mosaic Virus					
<i>Phloeomyzus passerinii</i>					



## GROWTH AND PRODUCTION PROPERTIES

**Suitability for vegetative propagation:** difficult rooting; requires thorough rehydration

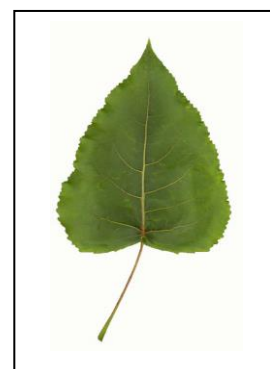
**Soil:** suitable for various types of soil

**Planting period:** winter

**Pruning:** not easy, requires frequent and timely interventions

**Growth:** relatively slow in the juvenile phase, steady later on

**Production:** superior to that of 'I-214'



# LAMBRO

## IDENTITY CARD

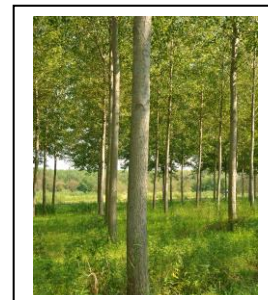
**Species:** *Populus ×canadensis* Moench

**Mother:** *Populus deltoides* W. Bartram ex Marshall '65-022'

**Father:** *Populus nigra* L. '68-096'

**Sex:** male

**Breeder:** Lapietra Gianfranco (Società Agricola Forestale- SAF)



## MORPHOLOGICAL PROPERTIES

**Phenotype:** similar to *Populus deltoides*

**Crown shape:** spreading

**Leaf colour:** red at budburst

**Leaf-bud colour:** reddish-brown

**Leaf budburst date:** medium

**Adult stem shape:** straight and cylindrical; with frequent formation of buttresses at the base

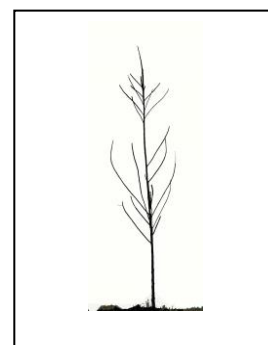
**Bark:** rough, brown in colour

**Wood:** basic density 0,36 g/cm<sup>3</sup>



## RESISTANCE TO THE MAIN BIOTIC ADVERSITIES

	Very low	Low	Moderate	High	Very high
<i>Venturia populina</i>					
<i>Melampsora</i> spp.					
<i>Marssonina brunnea</i>					
<i>Discosporium populeum</i>					
Brown spots					
Poplar Mosaic Virus					
<i>Phloeomyzus passerinii</i>					



## GROWTH AND PRODUCTION PROPERTIES

**Suitability for vegetative propagation:** good capacity of cuttings to form roots and good rooting of saplings

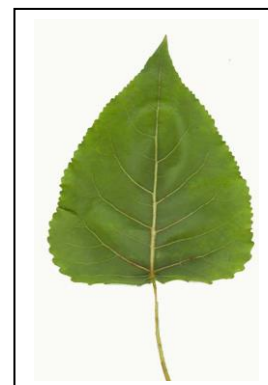
**Soil:** also suitable for coarse-texture soils

**Planting period:** during the period of vegetative dormancy

**Pruning:** not easy, tends to form large branches

**Growth:** fast

**Production:** high, superior to that of 'I-214'



## IDENTITY CARD

**Species:** *Populus deltoides* W. Bartram ex Marshall

**Mother:** *P. deltoides* (Illinois, USA)

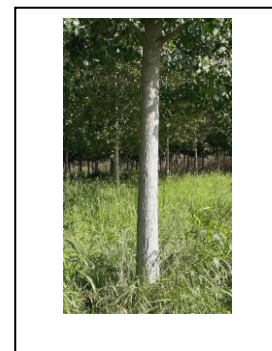
**Father:** free *in-situ* pollination (Casale Monferrato - AL, Italy)

**Sex:** male

**Breeder:** (CREA-PLF) Consiglio per la ricerca in agricoltura e l'analisi dell'economia agraria – Unità di ricerca per le produzioni legnose fuori foresta

**Community Plant Variety Right (CPVR) grant n°:** EU 7866

**CPVR Grant Owner:** Consiglio per la ricerca in agricoltura e l'analisi dell'economia agraria (CREA)



## MORPHOLOGICAL PROPERTIES

**Phenotype:** similar to *Populus deltoides*

**Crown width:** slightly spreading

**Leaf colour:** red at budburst, dark green when mature

**Leaf-bud colour:** red

**Leaf budburst date:** medium to late

**Adult stem shape:** slightly sinuous

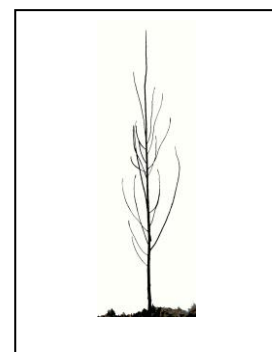
**Bark:** ridged, light gray in colour

**Wood:** basic density 0.33 g/cm<sup>3</sup>



## RESISTANCE TO THE MAIN BIOTIC ADVERSITIES

	Very low	Low	Moderate	High	Very high
<i>Venturia populina</i>					
<i>Melampsora</i> spp.					
<i>Marssonina brunnea</i>					
<i>Discosporium populeum</i>					
Brown spots					
Poplar Mosaic Virus					
<i>Phloeomyzus passerinii</i>					



## GROWTH AND PRODUCTION PROPERTIES

**Suitability for vegetative propagation:** fairly good rooting capacity of both cuttings and saplings

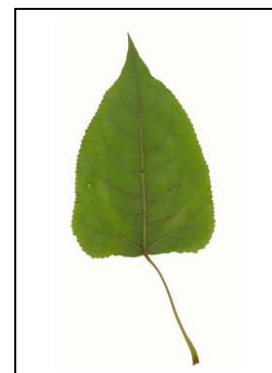
**Soil:** no particular edaphic requirements

**Planting period:** winter

**Pruning:** not difficult, provided operations are carried out timely

**Growth:** remarkably fast and constant

**Production:** superior to that of 'I-214'; the best results have been obtained in the central part of the Po Valley plain



IDENTITY CARD

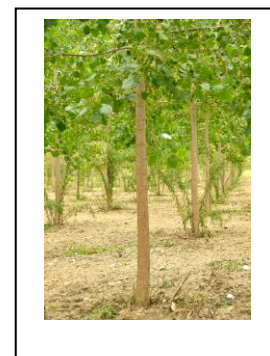
**Species:** *Populus deltoides* W. Bartram ex Marshall

**Mother:** *P. deltoides* '5/52' (Harvard University, USA)

**Father:** free *in-situ* pollination (Massac. County, Illinois, USA)

**Sex:** female

**Breeder:** (CREA-PLF) Consiglio per la ricerca in agricoltura e l'analisi dell'economia agraria – Unità di ricerca per le produzioni legnose fuori foresta

MORPHOLOGICAL PROPERTIES

**Phenotype:** similar to *Populus deltoides*

**Crown width:** spreading

**Leaf colour:** bronze at budburst

**Leaf-bud colour:** green

**Leaf budburst date:** early

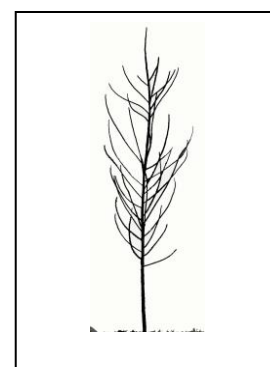
**Adult stem shape:** cylindrical, slightly sinuous

**Bark:** rough, gray in colour

**Wood:** basic density 0.37 g/cm<sup>3</sup>

RESISTANCE TO THE MAIN BIOTIC ADVERSITIES

	Very low	Low	Moderate	High	Very high
<i>Venturia populina</i>					
<i>Melampsora</i> spp.					
<i>Marssonina brunnea</i>					
<i>Discosporium populeum</i>					
Brown spots					
Poplar Mosaic Virus					
<i>Phloeomyzus passerinii</i>					

GROWTH AND PRODUCTION PROPERTIES

**Suitability for vegetative propagation:** fairly good; good rooting of saplings; the planting material must be free from symptoms of virosis

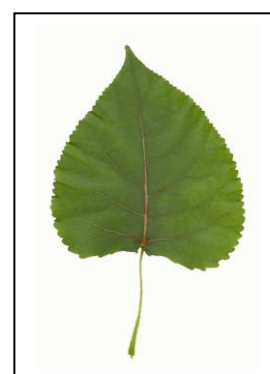
**Soil:** suitable for various types of soil

**Planting period:** winter

**Pruning:** not easy, frequent and timely operations are required

**Growth:** remarkably fast and steady

**Production:** potentially high, even in semi-extensive cultivation



IDENTITY CARD

**Species:** *Populus ×canadensis* Moench

**Mother:** *Populus deltoides* W. Bartram ex Marshall ‘3108’(Stoneville, USA)

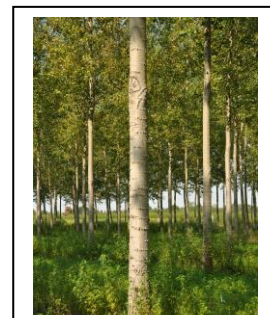
**Father:** *Populus nigra* L. ‘Italica M’ (Great Britain)

**Sex:** female

**Breeder:** Lapietra Gianfranco (CREA-PLF)

**Community Plant Variety Right (CPVR) grant n°:** EU 13689

**CPVR Grant Owner:** Consiglio per la ricerca in agricoltura e l’analisi dell’economia agraria (CREA)



MORPHOLOGICAL PROPERTIES

**Phenotype:** similar to *Populus ×canadensis*

**Crown width:** slightly spreading

**Leaf colour:** brown at budburst and dark green at maturity

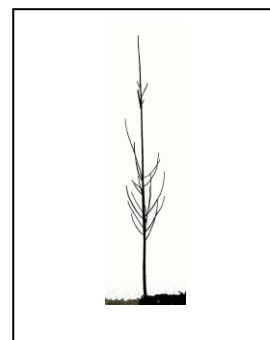
**Leaf-bud colour:** brown

**Leaf budburst date:** medium to late

**Adult stem shape:** straight and cylindrical

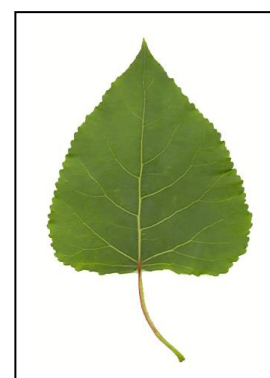
**Bark:** smooth, light gray in colour

**Wood:** basic density 0.33 g/cm<sup>3</sup>



RESISTANCE TO THE MAIN BIOTIC ADVERSITIES

	Very low	Low	Moderate	High	Very high
<i>Venturia populina</i>					
<i>Melampsora</i> spp.					
<i>Marssonina brunnea</i>					
<i>Discosporium populeum</i>					
Brown spots					
Poplar Mosaic Virus					
<i>Phloeomyzus passerinii</i>					



GROWTH AND PRODUCTION PROPERTIES

**Suitability for vegetative propagation:** good capacity of cuttings to form roots, good rooting of saplings

**Soil:** suitable also for clay soils

**Planting period:** during the period of vegetative dormancy

**Pruning:** easy; tends to form epicormic branches

**Growth:** fast, especially in the juvenile phase

**Production:** generally superior to that of ‘I-214’

**IDENTITY CARD**

**Species:** *Populus ×canadensis* Moench

**Mother:** *Populus deltoides* W. Bartram ex Marshall ‘D0-006’ (Texas, USA)

**Father:** *Populus nigra* L. ‘N325’ (Vacri PE, Italy)

**Sex:** male

**Breeder:** Gianni Facciotto, Lorenzo Vietto, Achille Giorcelli, Gaetano Castro, Gianni Allegro, Giuseppe Nervo, Maria de los Angeles Gras, Stefano Bisoffi (CREA-PLF)

**Community Plant Variety Right (CPVR) grant n°:** EU 40714

**CPVR Grant Owner:** Consiglio per la ricerca in agricoltura e l’analisi dell’economia agraria (CREA)



**MORPHOLOGICAL PROPERTIES**

**Phenotype:** similar to *Populus ×canadensis*

**Crown width:** slightly spreading

**Leaf colour:** brown at budburst

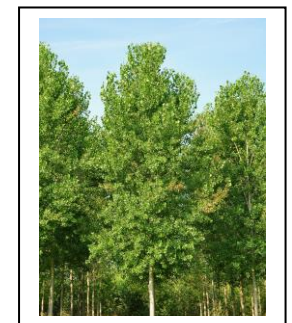
**Leaf-bud colour:** reddish-brown

**Leaf budburst date:** late

**Adult stem shape:** straight and cylindrical

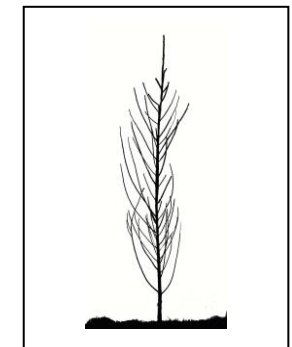
**Bark:** smooth, light gray in colour

**Wood:** basic density 0.38 g/cm<sup>3</sup>



**RESISTANCE TO THE MAIN BIOTIC ADVERSITIES**

	Very low	Low	Moderate	High	Very high
<i>Venturia populina</i>					
<i>Melampsora</i> spp.					
<i>Marssonina brunnea</i>					
<i>Discosporium populeum</i>					
Brown spots					
Poplar Mosaic Virus					
<i>Phloeomyzus passerinii</i>					



**GROWTH AND PRODUCTION PROPERTIES**

**Suitability for vegetative propagation:** good capacity of cuttings to form roots, very good rooting of saplings

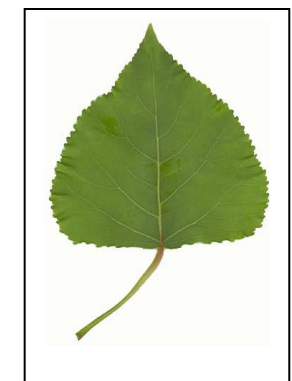
**Soil:** suitable for various types of soil

**Planting period:** during the period of vegetative dormancy

**Pruning:** not particularly difficult

**Growth:** fairly fast in the juvenile phase, steady afterwards

**Production:** generally superior of ‘I-214’ in clay soil





# MOMBELLO

## IDENTITY CARD

**Species:** *Populus ×canadensis* Moench

**Mother:** *Populus deltoides* W. Bartram ex Marshall ‘D0-132’ (Illinois, USA)

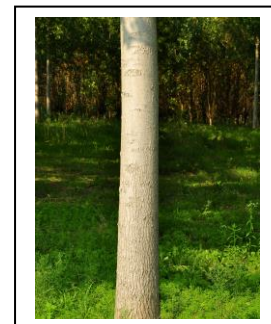
**Father:** *Populus nigra* L. (polycross)

**Sex:** male

**Breeder:** Gianni Facciotto, Lorenzo Vietto, Achille Giorcelli, Gaetano Castro, Gianni Allegro, Giuseppe Nervo, Maria de los Angeles Gras, Stefano Bisoffi (CREA-PLF)

**Community Plant Variety Right (CPVR) grant n°:** EU 40715

**CPVR Grant Owner:** Consiglio per la ricerca in agricoltura e l’analisi dell’economia agraria (CREA)



## MORPHOLOGICAL PROPERTIES

**Phenotype:** similar to *Populus ×canadensis*

**Crown width:** slightly spreading

**Leaf colour:** brown at budburst

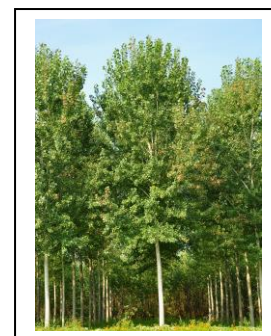
**Leaf-bud colour:** reddish-brown

**Leaf budburst date:** late

**Adult stem shape:** straight and cylindrical

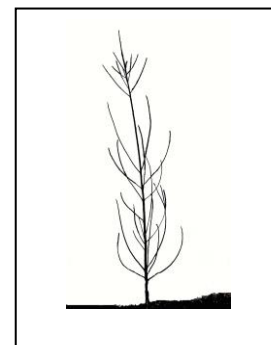
**Bark:** smooth, light gray in colour

**Wood:** basic density 0.37 g/cm<sup>3</sup>



## RESISTANCE TO THE MAIN BIOTIC ADVERSITIES

	Very low	Low	Moderate	High	Very high
<i>Venturia populina</i>				High	
<i>Melampsora</i> spp.				High	
<i>Marssonina brunnea</i>					Very high
<i>Discosporium populeum</i>				High	
Brown spots				High	
Poplar Mosaic Virus				High	
<i>Phloeomyzus passerinii</i>					Very high



## GROWTH AND PRODUCTION PROPERTIES

**Suitability for vegetative propagation:** very good capacity of cuttings to form roots and very good rooting of saplings

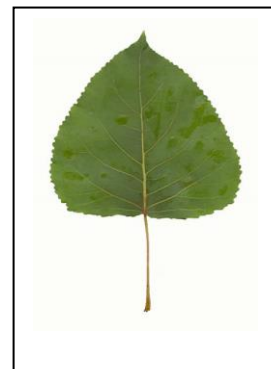
**Soil:** particularly suitable for alluvial loose soils

**Planting period:** during the period of vegetative dormancy

**Pruning:** not particularly difficult

**Growth:** fairly fast in the juvenile phase, steady afterwards

**Production:** equal or superior to that of ‘I-214’



## IDENTITY CARD

**Species:** *Populus ×canadensis* Moench

**Mother:** *Populus deltoides* W. Bartram ex Marshall ‘D0-131B’ (Illinois, USA)

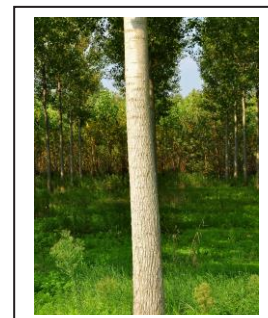
**Father:** *Populus nigra* L. (polycross)

**Sex:** male

**Breeder:** Gianni Facciotto, Lorenzo Vietto, Achille Giorcelli, Gaetano Castro, Gianni Allegro, Giuseppe Nervo, Maria de los Angeles Gras, Stefano Bisoffi (CREA-PLF)

**Community Plant Variety Right (CPVR) grant n°:** EU 40713

**CPVR Grant Owner:** Consiglio per la ricerca in agricoltura e l’analisi dell’economia agraria (CREA)



## MORPHOLOGICAL PROPERTIES

**Phenotype:** similar to *Populus ×canadensis*

**Crown width:** slightly spreading

**Leaf colour:** brown at budburst

**Leaf-bud colour:** reddish-brown

**Leaf budburst date:** medium to early

**Adult stem shape:** straight and cylindrical

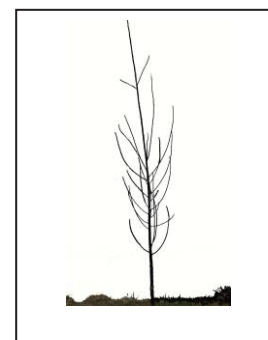
**Bark:** rough, light gray in colour

**Wood:** basic density 0.36 g/cm<sup>3</sup>



## RESISTANCE TO THE MAIN BIOTIC ADVERSITIES

	Very low	Low	Moderate	High	Very high
<i>Venturia populina</i>					
<i>Melampsora</i> spp.					
<i>Marssonina brunnea</i>					
<i>Discosporium populeum</i>					
Brown spots					
Poplar Mosaic Virus					
<i>Phloeomyzus passerinii</i>					



## GROWTH AND PRODUCTION PROPERTIES

**Suitability for vegetative propagation:** very good capacity of cuttings to form roots and very good rooting of saplings

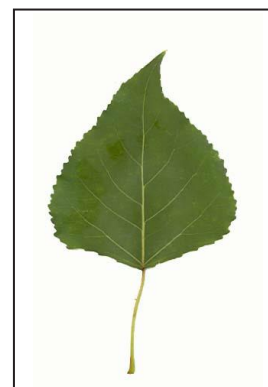
**Soil:** suitable for various edaphic conditions

**Planting period:** during the period of vegetative dormancy

**Pruning:** easy

**Growth:** quite fast in the juvenile phase, steady later on

**Production:** generally superior to that of ‘I-214’



## IDENTITY CARD

**Species:** *Populus deltoides* W. Bartram ex Marshall

**Mother:** ?

**Father:** ?

**Sex:** male

**Breeder:** (CREA-PLF) Consiglio per la ricerca in agricoltura e l'analisi dell'economia agraria – Unità di ricerca per le produzioni legnose fuori foresta

**Community Plant Variety Right (CPVR) grant n°:** EU 29841

**CPVR Grant Owner:** Consiglio per la ricerca in agricoltura e l'analisi dell'economia agraria (CREA)



## MORPHOLOGICAL PROPERTIES

**Phenotype:** similar to *Populus deltoides*

**Crown width:** spreading

**Leaf colour:** red at budburst, dark green at maturity

**Leaf-bud colour:** brown

**Leaf budburst date:** average to early

**Adult stem shape:** fairly straight and cylindrical, tends to bend on very fertile soils

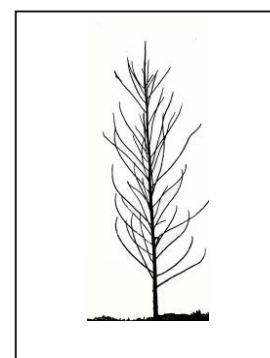
**Bark:** rough, brown in colour

**Wood:** basic density 0.35 g/cm<sup>3</sup>



## RESISTANCE TO THE MAIN BIOTIC ADVERSITIES

	Very low	Low	Moderate	High	Very high
<i>Venturia populina</i>					
<i>Melampsora spp.</i>					
<i>Marssonina brunnea</i>					
<i>Discosporium populeum</i>					
Brown spots					
Poplar Mosaic Virus					
<i>Phloeomyzus passerinii</i>					



## GROWTH AND PRODUCTION PROPERTIES

**Suitability for vegetative propagation:** good

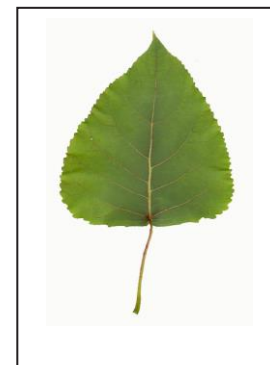
**Soil:** it grows well across a wide range of soil conditions; adapted also to coarse textured soils;

**Planting period:** winter

**Pruning:** requires timely interventions to avoid formation of large branches

**Growth:** very fast

**Production:** superior to that of 'I-214', particularly on sandy loam soils with good water availability



IDENTITY CARD

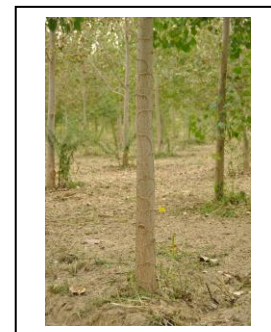
**Species:** *Populus deltoides* W. Bartram ex Marshall

**Mother:** *P. deltoides* var. 'Missouriensis'

**Father:** free *in-situ* pollination (Stoneville, Mississippi, USA)

**Sex:** male

**Breeder:** (CREA-PLF) Consiglio per la ricerca in agricoltura e l'analisi dell'economia agraria – Unità di ricerca per le produzioni legnose fuori foresta



MORPHOLOGICAL PROPERTIES

**Phenotype:** similar to *Populus deltoides*

**Crown width:** spreading

**Leaf colour:** light green at budburst

**Leaf-bud colour:** green

**Leaf budburst date:** late

**Adult stem shape:** straight and cylindrical

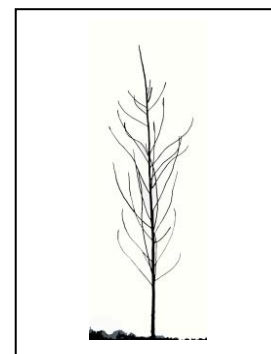
**Bark:** light gray in colour, slightly rough and ridged

**Wood:** basic density 0.31 g/cm<sup>3</sup>



RESISTANCE TO THE MAIN BIOTIC ADVERSITIES

	Very low	Low	Moderate	High	Very high
<i>Venturia populina</i>					
<i>Melampsora</i> spp.					
<i>Marssonina brunnea</i>					
<i>Discosporium populeum</i>					
Brown spots					
Poplar Mosaic Virus					
<i>Phloeomyzus passerinii</i>					



GROWTH AND PRODUCTION PROPERTIES

**Suitability for vegetative propagation:** fairly good; good rooting of saplings; the planting material must be free from symptoms of virosis

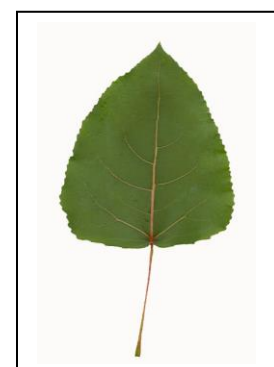
**Soil:** suitable for various types of soil

**Planting period:** winter

**Pruning:** difficult

**Growth:** quite fast in the juvenile phase

**Production:** equal to that of 'I-214'



# SAN MARTINO

## IDENTITY CARD

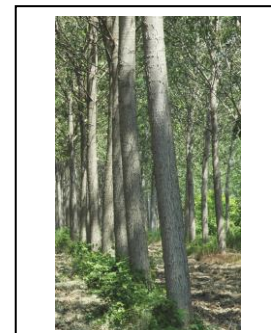
**Species:** *Populus ×canadensis* Moench

**Mother:** *P. ×canadensis* (San Martino Canavese, TO, Italy)

**Father:** free *in-situ* pollination (Casale Monferrato - AL, Italy)

**Sex:** female

**Breeder:** (CREA-PLF) Consiglio per la ricerca in agricoltura e l'analisi dell'economia agraria – Unità di ricerca per le produzioni legnose fuori foresta



## MORPHOLOGICAL PROPERTIES

**Phenotype:** similar to *Populus deltoides*

**Crown width:** spreading

**Leaf colour:** brown at budburst

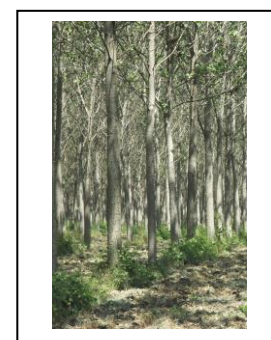
**Leaf-bud colour:** reddish-brown

**Leaf budburst date:** medium to early

**Adult stem shape:** cylindrical

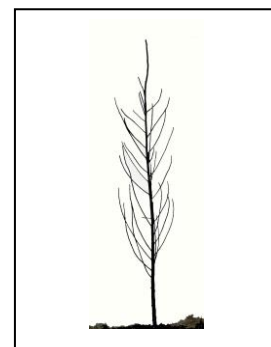
**Bark:** rough, gray in colour

**Wood:** basic density 0.31 g/cm<sup>3</sup>



## RESISTANCE TO THE MAIN BIOTIC ADVERSITIES

	Very low	Low	Moderate	High	Very high
<i>Venturia populina</i>					
<i>Melampsora</i> spp.					
<i>Marssonina brunnea</i>					
<i>Discosporium populeum</i>					
Brown spots					
Poplar Mosaic Virus					
<i>Phloeomyzus passerinii</i>					



## GROWTH AND PRODUCTION PROPERTIES

**Suitability for vegetative propagation:** fairly good rooting capacity of both cuttings and saplings; the planting material must be free from symptoms of virosis

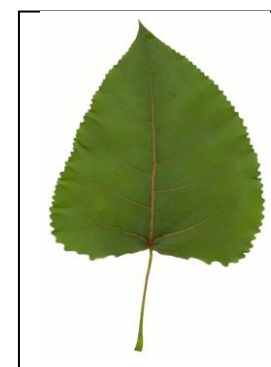
**Soil:** suitable for various types of soil

**Planting period:** best at the end of the period of vegetative dormancy

**Pruning:** not easy, requires timely and frequent interventions

**Growth:** superior to that of 'I-214' and steady

**Production:** high, also in non-intensive cultivation



# SENNA

## IDENTITY CARD

**Species:** *Populus ×canadensis* Moench

**Mother:** *Populus deltoides* W. Bartram ex Marshall ‘D0-006’ (Texas, USA)

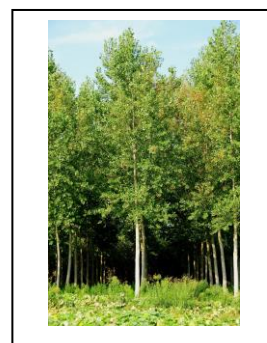
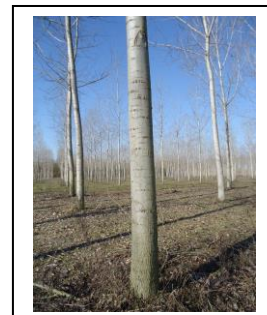
**Father:** *Populus nigra* L. (polycross)

**Sex:** female

**Breeder:** Giuseppe Nervo, Gianni Allegro, Gianni Facciotto, Achille Giorcelli, Lorenzo Vietto, Gaetano Castro, Stefano Bisoffi, Maria de los Angeles Gras (CREA-PLF)

**Community Plant Variety Right (CPVR) grant n°:** EU 44177

**CPVR Grant Owner:** Consiglio per la ricerca in agricoltura e l’analisi dell’economia agraria (CREA)



## MORPHOLOGICAL PROPERTIES

**Phenotype:** similar to *Populus ×canadensis*

**Crown width:** slightly spreading

**Leaf colour:** brown at budburst

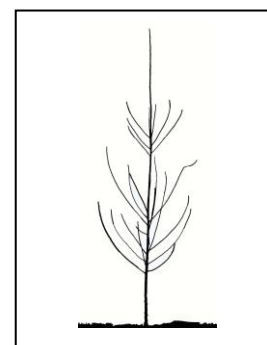
**Leaf-bud colour:** reddish-brown

**Leaf budburst date:** medium to late

**Adult stem shape:** straight and cylindrical

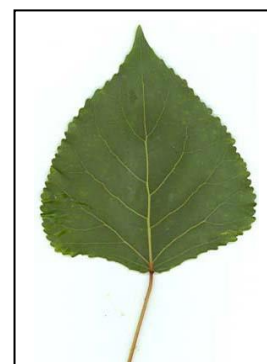
**Bark:** smooth, light gray in colour

**Wood:** basic density 0.31 g/cm<sup>3</sup>



## RESISTANCE TO THE MAIN BIOTIC ADVERSITIES

	Very low	Low	Moderate	High	Very high
<i>Venturia populina</i>				High	
<i>Melampsora</i> spp.					Very high
<i>Marssonina brunnea</i>				High	
<i>Discosporium populeum</i>				High	
Brown spots				High	
Poplar Mosaic Virus					Very high
<i>Phloeomyzus passerinii</i>					Very high



## GROWTH AND PRODUCTION PROPERTIES

**Suitability for vegetative propagation:** good capacity of cuttings to form roots, very good rooting of saplings

**Soil:** suitable for various types of soil, including clay soils

**Planting period:** during the period of vegetative dormancy

**Pruning:** easy, frequent and timely operations are required

**Growth:** fast in the juvenile phase, steady afterwards

**Production:** superior to that of ‘I-214’

### IDENTITY CARD

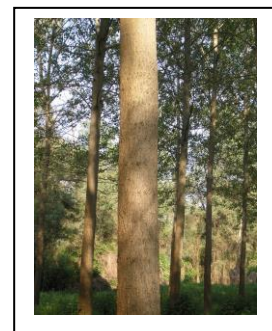
**Species:** interspecific hybrid

**Mother:** *Populus deltoides* W. Bartram ex Marshall '72-172' (Tennessee, USA)

**Father:** *Populus ciliata* Wall. ex Royle '72-109' (Pakistan)

**Sex:** female

**Breeder:** (CREA-PLF) Consiglio per la ricerca in agricoltura e l'analisi dell'economia agraria – Unità di ricerca per le produzioni legnose fuori foresta



### MORPHOLOGICAL PROPERTIES

**Phenotype:** not similar to any well-defined type

**Crown width:** narrow

**Leaf colour:** brown at budburst

**Leaf-bud colour:** reddish-brown

**Leaf budburst date:** medium to early

**Adult stem shape:** slightly sinuous and cylindrical

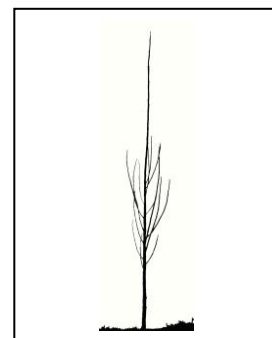
**Bark:** smooth, light gray in colour

**Wood:** basic density 0.34 g/cm<sup>3</sup>



### RESISTANCE TO THE MAIN BIOTIC ADVERSITIES

	Very low	Low	Moderate	High	Very high
<i>Venturia populina</i>					
<i>Melampsora</i> spp.					
<i>Marssonina brunnea</i>					
<i>Discosporium populeum</i>					
Brown spots					
Poplar Mosaic Virus					
<i>Phloeomyzus passerinii</i>					



### GROWTH AND PRODUCTION PROPERTIES

**Suitability for vegetative propagation:** very good rooting capacity of both cuttings and saplings

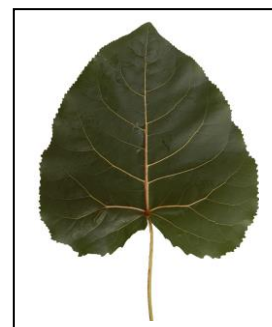
**Soil:** suitable for various types of soil

**Planting period:** during the period of vegetative dormancy

**Pruning:** easy

**Growth:** fast and steady

**Production:** equal or superior to that of 'I-214'



## IDENTITY CARD

**Species:** *Populus ×canadensis* Moench

**Mother:** interspecific hybrid ‘71-043’ (*P. deltoides* ‘51-119’ × *P. ×canadensis* ‘I-262’)

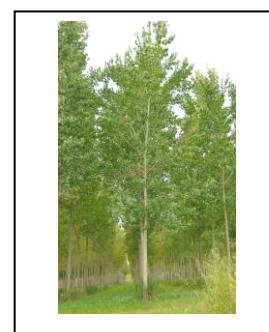
**Father:** free *in-situ* pollination (Casale Monferrato, AL, Italy)

**Sex:** male

**Breeder:** Lapietra Gianfranco (CREA-FL)

**Community Plant Variety Right (CPVR) grant n°:** EU 13691

**CPVR Grant Owner:** Consiglio per la ricerca in agricoltura e l’analisi dell’economia agraria (CREA)



## MORPHOLOGICAL PROPERTIES

**Phenotype:** similar to *Populus deltoides*

**Crown width:** spreading

**Leaf colour:** red at budburst

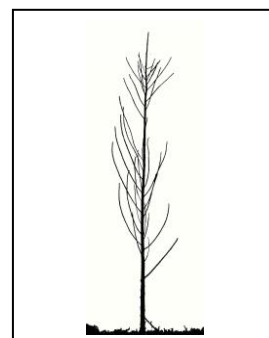
**Leaf-bud colour:** reddish-brown

**Leaf budburst date:** early to medium

**Adult stem shape:** straight and cylindrical

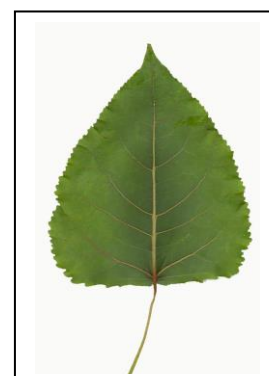
**Bark:** rough, brown in colour

**Wood:** basic density 0.35 g/cm<sup>3</sup>



## RESISTANCE TO THE MAIN BIOTIC ADVERSITIES

	Very low	Low	Moderate	High	Very high
<i>Venturia populina</i>					
<i>Melampsora</i> spp.					
<i>Marssonina brunnea</i>					
<i>Discosporium populeum</i>					
Brown spots					
Poplar Mosaic Virus					
<i>Phloeomyzus passerinii</i>					



## GROWTH AND PRODUCTION PROPERTIES

**Suitability for vegetative propagation:** fairly good rooting capacity, requires thorough rehydration

**Soil:** suitable also for coarse textured soils; not suitable for soils subject to water saturation

**Planting period:** during the period of vegetative dormancy

**Pruning:** not easy, tends to form large branches

**Growth:** very fast

**Production:** very high, superior to that of ‘I-214’



## IDENTITY CARD

**Species:** *Populus ×canadensis* Moench

**Mother:** *P. ×canadensis* '72-076'

**Father:** *P. ×canadensis* '72-014'

**Sex:** female

**Breeder:** (CREA-PLF) Consiglio per la ricerca in agricoltura e l'analisi dell'economia agraria – Unità di ricerca per le produzioni legnose fuori foresta



## MORPHOLOGICAL PROPERTIES

**Phenotype:** similar to *Populus ×canadensis*

**Crown width:** slightly spreading

**Leaf colour:** brown at budburst

**Leaf-bud colour:** reddish-brown

**Leaf budburst date:** average to early

**Adult stem shape:** slightly sinuous and cylindrical

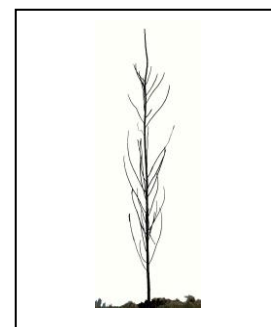
**Bark:** smooth, grayish-brown in colour

**Wood:** basic density 0.39 g/cm<sup>3</sup>



## RESISTANCE TO THE MAIN BIOTIC ADVERSITIES

	Very low	Low	Moderate	High	Very high
<i>Venturia populina</i>					
<i>Melampsora</i> spp.					
<i>Marssonina brunnea</i>					
<i>Discosporium populeum</i>					
Brown spots					
Poplar Mosaic Virus					
<i>Phloeomyzus passerinii</i>					



## GROWTH AND PRODUCTION PROPERTIES

**Suitability for vegetative propagation:** fairly good rooting capacity of both cuttings and saplings; requires thorough rehydration

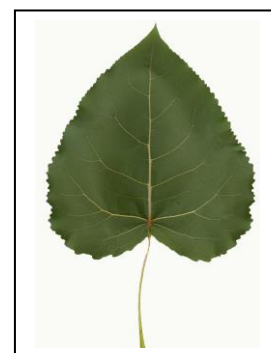
**Soil:** suitable for various types of soil

**Planting period:** during the period of vegetative dormancy

**Pruning:** easy

**Growth:** relatively slow in the juvenile phase, steady afterwards

**Production:** equal to that of 'I-214'



# TARO

## IDENTITY CARD

**Species:** interspecific hybrid

**Mother:** interspecific hybrid '71-043' (Casale Monferrato - AL, Italy)

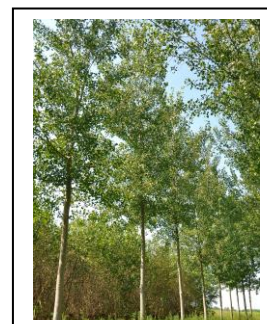
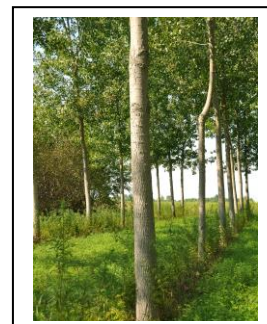
**Father:** interspecific hybrid 'Elvo' (Casale Monferrato - AL, Italy)

**Sex:** male

**Breeder:** Lapietra Gianfranco (CREA-FL)

**Community Plant Variety Right (CPVR) grant n°:** EU 13692

**CPVR Grant Owner:** Consiglio per la ricerca in agricoltura e l'analisi dell'economia agraria (CREA)



## MORPHOLOGICAL PROPERTIES

**Phenotype:** not similar to any well-defined type

**Crown width:** slightly spreading

**Leaf colour:** dark green both at budburst and when mature

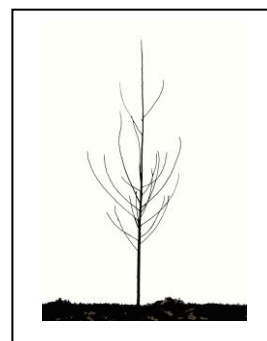
**Leaf-bud colour:** brown

**Leaf budburst date:** medium to late

**Adult stem shape:** straight and cylindrical

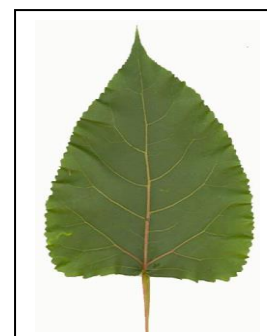
**Bark:** smooth, grayish in colour

**Wood:** basic density 0.37 g/cm<sup>3</sup>



## RESISTANCE TO THE MAIN BIOTIC ADVERSITIES

	Very low	Low	Moderate	High	Very high
<i>Venturia populina</i>					
<i>Melampsora</i> spp.					
<i>Marssonina brunnea</i>					
<i>Discosporium populeum</i>					
Brown spots					
Poplar Mosaic Virus					
<i>Phloeomyzus passerinii</i>					



## GROWTH AND PRODUCTION PROPERTIES

**Suitability for vegetative propagation:** good

**Soil:** no particular edaphic requirements

**Planting period:** during the period of vegetative dormancy

**Pruning:** easy

**Growth:** fast in the juvenile phase, slow towards the end of rotation

**Production:** equal to that of 'I-214', especially in temperate-cold climates

# TUCANO

## IDENTITY CARD

**Species:** *Populus ×canadensis* Moench

**Mother:** *Populus deltoides* W. Bartram ex Marshall 'D0-006' (Texas, USA)

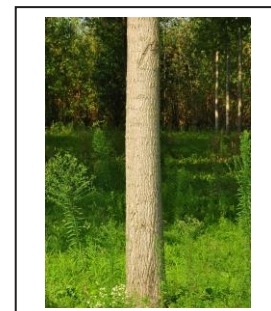
**Father:** *Populus nigra* L. 'N110' (Fontevivo - PR, Italy)

**Sex:** male

**Breeder:** (CREA-PLF) Consiglio per la ricerca in agricoltura e l'analisi dell'economia agraria – Unità di ricerca per le produzioni legnose fuori foresta

**Community Plant Variety Right (CPVR) grant n°:** EU 38493

**CPVR Grant Owner:** Consiglio per la ricerca in agricoltura e l'analisi dell'economia agraria (CREA)



## MORPHOLOGICAL PROPERTIES

**Phenotype:** similar to *Populus ×canadensis*

**Crown width:** slightly spreading

**Leaf colour:** brown at budburst, dark green when mature

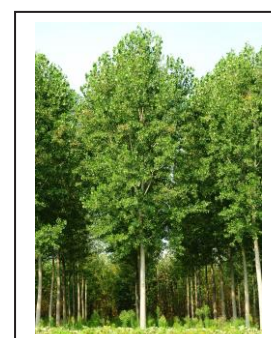
**Leaf-bud colour:** reddish-brown

**Leaf budburst date:** medium to late

**Adult stem shape:** straight and cylindrical

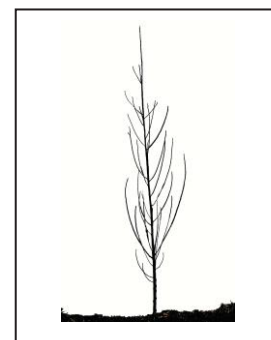
**Bark:** slightly rough, gray in colour

**Wood:** basic density 0.35 g/cm<sup>3</sup>



## RESISTANCE TO THE MAIN BIOTIC ADVERSITIES

	Very low	Low	Moderate	High	Very high
<i>Venturia populina</i>					
<i>Melampsora</i> spp.					
<i>Marssonina brunnea</i>					
<i>Discosporium populeum</i>					
Brown spots					
Poplar Mosaic Virus					
<i>Phloeomyzus passerinii</i>					



## GROWTH AND PRODUCTION PROPERTIES

**Suitability for vegetative propagation:** very good rooting capacity of both cuttings and saplings

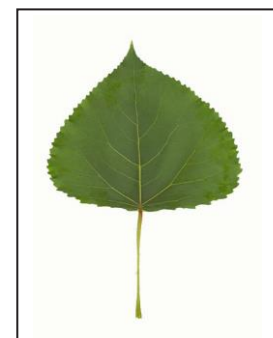
**Soil:** suitable for various types of soil, including clay soils

**Planting period:** during the period of vegetative dormancy

**Pruning:** frequent and timely operations are required

**Growth:** quite fast in the juvenile phase, steady afterwards

**Production:** very high, superior to that of 'I-214'



## IDENTITY CARD

**Species:** *Populus alba* L.

**Mother:** *P. alba* 'No. 2 Istituto Pignatelli' (Italy)

**Father:** *P. alba* 'No. 2 Lucca' (Italy)

**Sex:** female

**Breeder:** (CREA-PLF) Consiglio per la ricerca in agricoltura e l'analisi dell'economia agraria – Unità di ricerca per le produzioni legnose fuori foresta



## MORPHOLOGICAL PROPERTIES

**Phenotype:** similar to *Populus alba*

**Crown shape:** spreading

**Leaf colour:** dark green on the upper side, white underneath (due to woolly pubescence)

**Leaf-bud colour:** green

**Leaf budburst date:** early

**Adult stem shape:** quite straight and cylindrical

**Bark:** smooth, whitish in colour

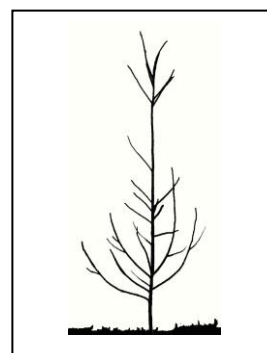
**Wood:** basic density 0.33 g/cm<sup>3</sup>



## RESISTANCE TO THE MAIN BIOTIC ADVERSITIES \*

	Very low	Low	Moderate	High	Very high
<i>Venturia populina</i>					
<i>Melampsora</i> spp.					
<i>Marssonina brunnea</i>					
<i>Discosporium populeum</i>					
Brown spots					
Poplar Mosaic Virus					
<i>Phloeomyzus passerinii</i>					

\* This clone shows non-host resistance to the parasites listed in the table. Its behaviour has therefore been considered as equal to that of the most resistant clones



## GROWTH AND PRODUCTION PROPERTIES

**Suitability for vegetative propagation:** fairly good; slowly rooting of saplings and fairly good capacity of cuttings to form roots: cuttings must be at least 25-30 cm long

**Soil:** suitable for various types of soil except for those with sub-acid pH or subject to water saturation

**Planting period:** winter period

**Pruning:** not easy, requires frequent shaping interventions

**Growth:** quite slow, especially in the juvenile phase

**Production:** lower than that of 'I-214'; requires long rotations (15-20 years)







