

---

\*

( // : // : )

)

(% % % % )  
% %

(

Archive of SID

Norouzi, )

(2008

(Rabiee et al., 2008)

(Francis et al., 2004)

( \* )

%

(Gorgi bahri et al., 2007)

(Nazarnejad et al., 1996)

CMP

(Taghiyari, 2008)

(Ghasemi et al., 2001)

---

<sup>2</sup> *P. nigra* and *P. euroamericana*.

<sup>3</sup> Aspen (*P. tremuloides*)

<sup>4</sup> Collapse

<sup>1</sup> Hybrid

---

Ghasemi et al., )

(Balatinez et al., 2001) .

(2002

×

( )

UM-5

(Francis et al., 2006) .

UM-10

et .

(MacLeod al., 2007)

( )

" "

%

%

---

<sup>3</sup> Pallmann

<sup>4</sup> TAPPI Useful Methods, 1991

<sup>5</sup> Rotary digester

---

<sup>1</sup> Runnability

<sup>2</sup> Crandon (*P. alba*×*P. grandidentata*)

...

%

%

" "

---

ISO 187-1990

TAPPI,(T410 om-02)

ISO 534- 2005

ISO 536- 1995

T233cm-  
TAPPI,(06)

ISO 2758- 2001

ISO 536- 1995

ISO 1924/2-2008

---

(UM-246)

(C : )

T248sp- 00

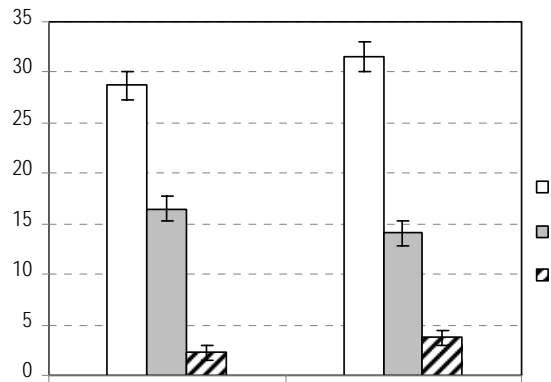
Archive of SID

(M : )

---

<sup>4</sup> Arithmetic average  
<sup>5</sup> Weighted average

<sup>1</sup> Defibrator  
<sup>2</sup> Reject  
<sup>3</sup> PFI-Mill



%

%

Archive of SID

---



---

/	/	/	/	/	/	/
/	/	/	/	/	/	/
/	/	/	/	/	/	/
/	/	/	/	/	/	/
		/	/	/	/	/

---

...

---

---

---

/	/	/	/	/	/	/
/	/	/	/	/	/	/
/	/	/	/	/	/	/
/	/	/	/	/	/	/
		/	/	/	/	/

---

Archive of SID

---

( )	( )
( )	( )
/ n.s.	/ //
/	/ //

---

n.s.

%



(Rabiee et al.,2008)

(Joon, 2000) .

.(Lindholm et al., 1999)

(MacLeod et al., 2007)

.(Croy, 2002)

(Francis et al., 2006)

/ / % / % /

.(Kamarei et al., 2009)

<sup>1</sup> Morphology

<sup>2</sup> *P. alba* × *P. grandidentata*, *P. deltoides* × *P. maximowiczii*



---

Mirshokraei, ) ( )  
(2003)

(Nasir, 2002)

Ferancis et al.,  
(2004)

S<sub>2</sub>  
( > )

( )  
(Rabiee, et al., 2008)

)  
( )  
(Balatinez et al., 2001)

Francis, et al., 2006)

( / )

"

(Tabet & Abdul Aziz, 2010) .

(Via et al., 2004) .

Rabiee, et)

(al., 2008

"

---

<sup>1</sup> Coarseness

---

## References

- Ahmadi, N., Mohebi, B., and Behrooz, R., 2009. Influence of Chemi-Mechanical pulp (CMP) Acetylation on Paper Properties, Tarbiat Modares University, Faculty of Natural Resources, M.Sc. Thesis in Wood and PaperSciences. 56 pp.
- Balatinez, J., Kretschmann, D.E. and Leclercq, A. 2001. Achievements in the utilization of poplarwood - guideposts for the future. The Forestry Chronicle. Vol. 77(2): 265-269.
- Croy, T. 2002. Kraft Pulping of Individual Chip Thickness Fractions. Pulping Process & Product Quality Conference Proceedings, pp. 125-127.
- Ferancis, R.C., Brown A.F., Hanna, R.B., and Kamdem, D.P. 2004. The DN 30 hybrid poplar—a fiber source for high strength hardwood pulps, TAPPI J. 3(2):3-4.
- Ferancis, R.C., Brown A.F., Bosshert R.P., Balch S.E., and Waite D.M. 2007. Additional Hybrid Poplars with Papermaking Properties Superior Aspen, Empire State Paper Research Institute. SUNY College of Environmental Science and Forestry, Syracuse, New York 13210. 5 p.
- Francis, R.C. Hanna, R.B. Shin S.-J. Brown, A.F. and Riemenschneider, D.E. 2006. Papermaking characteristics of three populous clones grown in the north-central; United States a Faculty of Paper Science and Engineering, SUNY College of Environmental Science and Forestry (SUNY-ESF), Biomass and energy 30(8-9): 803-808.
- Ghasemi, R., Jalili, A., Akbarinia, M. and Modirrahmati, A. 2001. Investigation on phonology of different poplar clones in mother collection of Alborz Research CENTER, Forest and Poplar Research Journal. 6: 18-24.
- Gorgi Bahri, Y. Hemati, A. and Mahdavi, R. 2007. Effect of medium and high thinning on *P. taeda* in Gillan, Forest and Poplar Research Journal,15: 217-239.
- Aghajani, M., Jahan Latibari, A., Pezeshkian, SH., Dorudi, M., and Salimi, A., 1987. Specification of bleached Kraft paper, Institute of Standards and Industrial Research of Iran, First edition, No. 2875.
- Vosoughi, F., Izadyar, S., Badri Kouhi, M., Heidari, K., Khooban, M., and Razavian, A., 1996. Liner paper – specification and methods of test, Institute of Standards and Industrial Research of Iran, Second edition, No. 3054.
- Joon, A., 2000. High yield of hybrid poplar wood by integrating steam explosion process as a pre stage to alkali, MSc. Thesis, Faculty of Forestry, University of Toronto, Toronto, Canada. 88 p.
- Kamarei, M., Hamzeh, Y., Mahdavi, S., Azadfallah, M. and Hejazi, S., 2011. The effect of surfactants on CMP pulps of poplar, Journal of forest and wood products. 64(3). 231- 238.
- Lindholm, C. A., & Kurdin, J. A., 1999. Chemimechanical Pulping, Papermaking Science and Technology, Book 5: Mechanical Pulping. Finland. Fapet Oy. 321 p.
- MacLeod, M. 2007. The top ten factors in Kraft pulp yield, Paperi ja Puu – Paper and Timber, 89 (4):1-7.
- Mirshokraei, A., 2003. Handbook of Pulp and Paper Technology, Payam Noor University, Vol. 1, 354 p.
- Nasir, G.M. 2002. Fiber Morphology in Relation to Suitability for Pulp and Paper, Forest Products Research, Pakistan Forest Institute, Peshawar, 3 p.
- Nazarnejad, N. and Resalati, H., Jahan Latibari, A., Hosseinzadeh, A., and Talaeipour, M. 1996. Investigation on high yield CMP pulping of *P. deltoieds* and *P. Euromericana*, Journal of Pajoohesh va Sazandeghi, 36: 32-34.
- Noruzi, A. 2008. Problems against Iranian wood and paper industries developing. The first Iranian conference on supplying raw materials and development of wood & paper industries, Gorgan University, 16 p.
- Rabiee, S., Varshoei, A. and Mahdavi, S., 2008. Comparative study on morphological and chemical properties of five poplar clones, M.Sc. Thesis, Islamic Azad University, Chaloos Branch. 77 pp.
- Tabet, T. A. and Abdul Aziz, F.H. 2010. Influence of Microfibril Angle on Thermal and Dynamic-Mechanical Properties of *Acacia mangium* Wood Using X-Ray Diffraction and Dynamic-Mechanical Test, Proceedings of the World Congress on Engineering, Vol. II, London, U.K, pp. 1004-1009.
- Via, B.K., Stine, M., Shupe, T.F., So, C.L. & Groom, L. 2004. Genetic improvement of fiber length and coarseness based on paper product performance and material variability- A review, IAWA Journal.25 (4): 401-414.

## Kraft Pulping of Two Fast Growing *Populus euramericana* Clones

S. Mahdavi<sup>\*1</sup>, H. Kermanian<sup>2</sup>, O. Rameani<sup>2</sup> and S. Molavi<sup>3</sup>

<sup>1</sup> Assistant prof., Wood and Forest Product Research Division, Research Institute of Forests and Rangelands, I.R. Iran

<sup>2</sup> Assistant prof., Department of pulp and paper, Energy and New Technology Faculty, Zirab Branch, Beheshti University, I.R. Iran

<sup>3</sup> Graduated in Master of Science of Wood and Paper Science and Technology, I.R. Iran

(Received: 01 November 2010, Accepted: 03 August 2011)

### Abstract

Based on the results of field experiments on poplar clones in Karaj, two fast-growing Clones of *Populus euramericana* i.e. *P.e. vernirubensis* & *P.e. costanzo* were selected for pulping investigation. Three trees from each clone at the age of 12 years were selected and samples were cut at the breast height. Average length, width and thickness of the chips showed no significant difference. Kraft pulping variables including five pulping times (15 to 75 min.) and two chemical charges (18 % AA at 23 % Sulfidity and 20 % AA at 25 % Sulfidity) were applied. The accepted yield, kappa number and rejects measurement of pulps showed that the optimal pulping condition is cooking time 45 min and AA 18% at 23% Sulfidity. The pulps from the two clones showed no significant difference in pulp beatability to target freeness of 400 ml CSF. Bauer McNett fiber classification test showed that *P.e. costanzo* provides higher fiber length and lower fines content. Statistical comparison of wood production, pulp and handsheet properties of the two clones indicated that *P.e. costanzo* is superior clone in burst strength index and average fiber length, whereas *P.e. vernirubensis* is more suitable in terms of growth rate and tear strength index. Significant differences were not observed between clones in other properties.

**Keywords:** Populus, kraft pulp, screen yield, kappa number., fiber classification, paper strengths