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FIVE YEARS PERFORMANCE OF NEW INTRODUCED SALT TOLERANT HYBRID POPLAR (*POPULUS EUPHRATICA* OLIV. × *P.ALBA* L. AND*POPULUSALBA* L. × *P.EUPHRATICA* OLIV) IN IRAN (WEST AZAR-BAYJAN)

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ABSTRACT: *Due to various reaction of new hybrid in different climate conditions, test of adaptability is necessary. In order to introduce new poplar hybrids (Populus euphratica Oliv. × P.alba L. and Populus alba L. × P. euphratica Oliv) in different part of country, ecological range of productivity have to be determined. In this study, adaptability of Populus euphratica Oliv. X P.alba L. and it's reciprocal crosses hybrid, along with Populus alba L as native clones were tested in Rasol Research station belong to Central Research of Agriculture and Natural Resources of West Azar-Bayjan during (2004-2009) The experiment was conducted through randomized complete block experimental design (RCBD). Twenty five individual cutting of three clones (Two hybrid and one native clones) planted in 100 square meter (2 × 2 meter distance between rows and space between cutting respectively) as an experimental unite and replicated three. Analysis of collected data have been done base on quantities and qualitative dates during five years. The results indicated that there were a significant differences between clones at α=0.01%. Populus euphratica Oliv. × P.alba L hybrid showed highest breath diameter height (11.30cm), and total height (10 meter) than the others two. Low level of breath diameter height (4.15 cm), and total height (5.5 meter) were observed for Populus alba L. clone as a control.*

KEYWORDS: Hybrid Poplar, Inter Specific Hybrid, *Populus Euphratica* Oliv. × *P.alba* L, *Populus Alba* L. × *P. Euphratica* Oliv.

INTRODUCTION

Iran belong to low forest coverage countries (LFCC). Total forest area in Iran is estimated 12.4 million hectares but only 1.2 million hectares can be considered as commercial forest. In spite of such a situation , forest in Iran are being quick damaged by too many factors. Mean individual wood consumption rate in country was estimated 0.2 m^3 which is lowest amount than the mean world individual consumption (Bagheri,1996). Poplar produced highest wood (1.5 million m^3) than the wood which are produced by forests and other wood production sources (Jallili, 2009). Therefore wood production through fast growing trees especially poplars, became an urgent task of our government. Among poplar trees, *Populus euphratica* Oliv. has been showed, varying degrees of tolerance to the salinity , periodic water longing, cold and arid conditions (Kalagry *et al*., 2000, Wiart, 1988). Unfortunately, overuse has removed many of the stems of better form, so that natural stands now usually appear small and crooked (Jafari *et al*., 1998). Numerous attempts have been done to improve such a highly propagated tree, using genetic manipulation process (interspeciefic hybridization between *Populus euphratica* Oliv. × *P. alba* L.(Jafari Mofidabdi *et al*. 1998; Jafari Mofidabadi and Modir-Rhmati, 2000; Li et al.,1983; Li and Li, 1985).Hybridization is

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currently used to combine desirable traits and to achieve hybrid vigor in many crops and trees (Tabaii-Aghdaii and Jafari Mofidabadi and Modir-Rhmati, 2000, Pryor and willing, 1983). There has been a long interest in the hybridization of poplar largely because of the benefits derived from capturing heterosis and combining desirable traits to improved the quality and amount of wood production (Jafari Mofidabdi *et al*., 1998). In view of its resistance to drought and salinity, *Populus euphratica* Oliv. has been chosen as a parental species in poplar breeding. Incompatibility which have been observed between this species with other poplars species have been solved by *In vitro* embryo culture (Li et al.,1983). Inter-specific hybrid between *Populus euphratica* Oliv. and *P. alba* L. have been produced into direction in Iran (Jafari Mofidabdi *et al*., 1998; Jafari Mofidabadi and Modir-Rhmati, 2000). Introduction of new hybrid poplar is a routine work in Iran. Due to various reaction of plants in different climate conditions and its economical products, test of adaptability is an urgent task of breeder particularly for introduction of new hybrid in a given areas. Adaptability of tree in different climate conditions depend to the genetic potential and its interaction with environment factors [1](Kalagari, 1998; Yu and Pulkkinen, 2003). In order to introduce new poplar hybrids (*Populus euphratica* oliv. × *P.alba* L. and *Populus alba* L. ×*P. euphratica* Oliv.) in different part of country for poplar wood production particularly in saline soil, ecological range for economically wood production have to be determine. Therefore test of adaptability and its economically wood production of *Populus euphratica* Oliv. × *P.alba* L. and its reciprocal crosses, were studied in Rasol-Abad Salty-soil Research station of Central Research of Agriculture and Natural Resources of West Azar-Bayjan (2004-2009).

MATERIAL AND METHODS

Three hundred potted stem cutting of four poplars clones such as *P. alba* L.×*P. euphratica* Oliv., *P. euphratica* Oliv. ×*P. alba* L. and two *P. nigra* L., *populus alba.* L as a local clones were planted in Boldaji Research station belonging to Research Center of Agriculture and Natural Resources in Chaharmahal and Bakhtiari province. The experiment were conducted based on Complete Randomized Block Design (RCBD) with 3 replications. Seventy five potted stem cutting were planted in a three rows with 250 centimeter row-spacing and 200 centimeters space between cutting as an experimental unit. All the recommended cultivation practices as weeding, fertilizers and irrigation were done properly at the required time. Analysis of variance and mean separation of collected dates were carried out for total height, diameter at breath height trunk height, cold and pest resistance.

RESULTS AND DISCUSSION

There were highly significant differences between clones for height at α=0.01 level (Table 1and Fig.1). Highest growth were observed for *Populus euphratica* Oliv. × *P. alba* L.. (average 10 meters) while *Populus alba* L. with 5.5 meters showed lowest level of height growth (table 2 and Fig.1).

There were highly significant differences between clones for diameter breath height (dbh) α=0.01 level (Table 1). Highest diameter at breath height was observed for *Populus alba* L.

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× *P.euphratica* Oliv. (11.30 cm) while *Populus nigra* L. showed lowest level of diameters at breath height (4.1 cm) (Table 2). No significant differences were observed between *Populus. alba* L. ×*P. euphratica* Oliv. and *Populus euphratica* Oliv. × *P. alba* L hybrids. *Populus. alba* L. ×*P. euphratica* Oliv. with 9.35 meter height and 10 centimeter diameter breath height showed its superiority to the *Populus alba* L. clone as a local tree.

There was significant differences between clones for survivable rate at α=0.05 level at the end of five years experiment (Fig.1). *Populus euphratica* Oliv. × *P.alba* L showed highest survivable rate (97.5%) while lowest level of survivable (84%) was observed for *P.alba* L local trees (Fig.2).

Table. Analysis of collected dates for adaptability of four poplars clones

Source of variation	Df	MS		
		Height	Dbh	Survivable rate
Clones	2	119358**	48.31**	1353*
Error	29	9594	1.76	253.9
Total	8			

**= significant differences at 0.01 level

*= significant differences at 0.05 level

Table 2. Mean comparison of different characters of four poplar clones

Clones	No	Height(M)		Dbh (cm)		Survivable rate (%)
		Mean	Record	Mean	Record	
P. euphratica×*P. alba*	75	5.85 a	10	5.98a	11.30	97.5a
Populus alba L. × *P. euphratica* Oliv	75	5.67a	9.35	5.75a	10	87a
P. alba	75	2.95b	5.5	2.45b	4.15	84b

The same letters indicated no significant different at α=0.01 level

Low productivity of native poplar clones caused decreasing poplar cultivation area. Therefore use of hybrid poplar is necessary to increase wood production in many part of the country (Iran-Menesh, 2008). Inter and intra-specific hybridization and selection of superior hybrid progeny approach in country, have been caused successfully introduction of many hybrid clones (Jafari *et al.,* 1998). For introduction of a new hybrid poplar clones, superiority of hybrid against native clones have to be proved (Asareh, 2009). Narrow and broad senses adaptability trail of *Populus euphratica* Oliv. × *P. alba* L. and its reciprocal crosses have been conducted through country for maximum use of heterotic effect in wood production (Ghemeri-Zareh,.2008). In this study heterotic effect for total height and breath height diameter were observed in hybrid poplar *Populus euphratica* Oliv. × *P.alba* L. and *Populus alba* L. × *P. euphratica* Oliv. and showed to be better than the local clone of poplars *Popolus alba* L.. In contrast to the Charmehal-Bakhtiari province, *Populus euphratica* Oliv. × *P.alba* L. hybrid, showed highest adaptability and performance than the *Populus alba* L. × *P.euphratica* Oliv. and *Populus alba* L. as a local clones in West Azar-Bayjan (Ghameri-zareh 2008). The research which was conducted by Talabi 2008, indicated that *Poplus alba* L with high performance was the best among the other different poplar clones in a five years adaptability trail and introduced as a superior clones for wood production in Charmehal-Bakhtiari provence (Talebi, 2008). *Populus alba* L. × *P. euphratica* Oliv. Showed its

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superiority in trunk height and breath height diameter to the *Populus euphratica* Oliv. × *P.alba* L, *Populus nigra* L. and *Populus alba* L. (Talebi *et al*. 2008). Due to low level cold tolerance of *P.euphratica* Oliv. As a maternal parent in *Populus euphratica* Oliv. × *P.alba* L. hybrid, serious damage have been observed in upper part of trees under –minus 30°c (2005) on this hybrid at Chatmehal-e-Bkhtiyari.While *Populus alba* L. × *P.euphratica* Oliv. Showed high level of cold tolerance and had not been effected in minus 30°c. This is may be due to cold tolerance of *P.alba* L. as a maternal parent in *Populus alba* L. × *P.euphratica* Oliv. Hybrid. Regrinding to cold susceptibility of *Populus euphratica* Oliv. × *P.alba* L., it cannot be suggested for wood cultivation program on the Charmehal-Bakhtiari provence. In spite of cold susceptibility of *Populus euphratica* Oliv. × *P.alba* L., this kind of hybrid showed higher resistance than the other three against *Mela nophila picta pall*. This is may be due to high resistance of *Populus euphratica* Oliv. as a maternal parent.

In contrast to the Charmehal-Bakhtiari province which sudden cold condition caused damage for *Populus euphratica* Oliv. x *P. alba* L. hybrid, no cold effect was reported in West Azar-Bayjan. Cold resistance of poplar clones including *Populus euphratica* Oliv. x *P. alba* L. hybrid in Charmehal-Bakhtiari province, indicated that only *Populus euphratica* Oliv. × *P. alba* L. are sensitive to winter and spring cold condition (under minus 30°c). Terminal bud burning damage caused branching in upper part of *Populus euphratica* Oliv. × *P. alba* L. tree in next growing season. *Populus alba* L. and *Populus alba* L. × *P. euphratica* Oliv. showed resistance to the cold (minus 30°c) during experiment period and no damage was observed. *Populus euphratica* Oliv. × *P.alba* L., hybrid showed higher resistance than the other three against Melanophila picta pall. This is may be due to high resistance of *Populus euphratica* Oliv. which was chosen as a maternal parent.

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APPENDIX

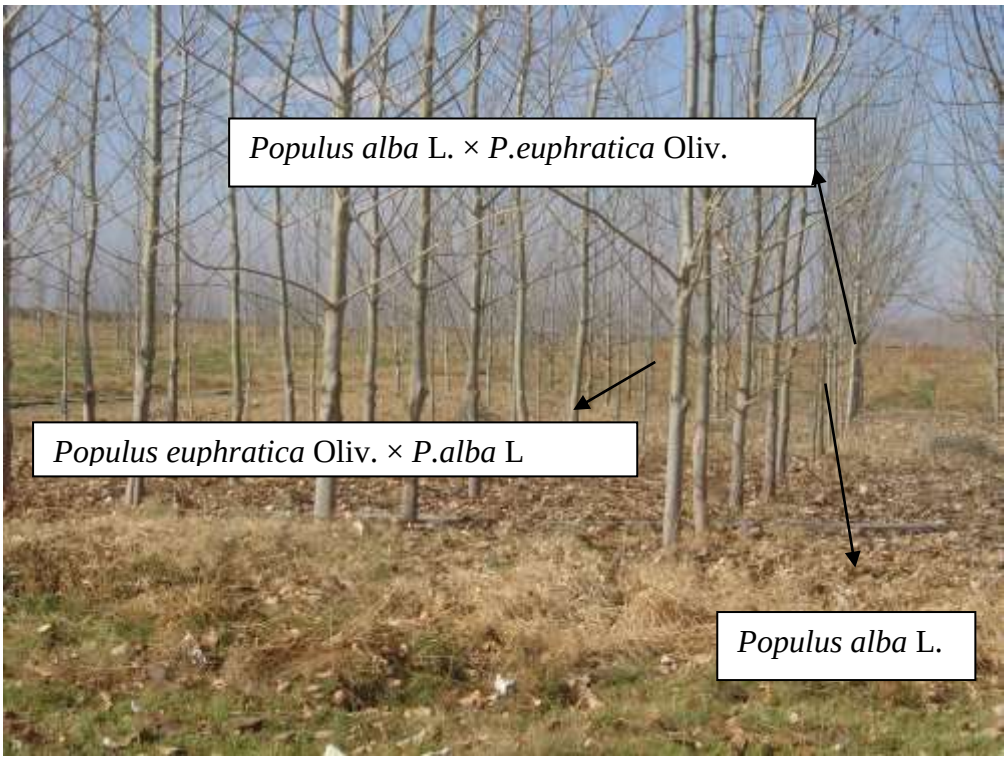

Figure 1. Five year performance of *Populus euphratica* Oliv. × *P.alba* L,. *Populus alba* L. × *P.euphratica* Oliv. and *Populus alba* L. in Rasol-Abad Salty-soil Research station belong to Central Research of Agriculture and Natural Resources (West Azar-Bayjan Province)

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