ANTIOXIDATIVE ACTIVITY OF CITRIC AND ASCORBIC ACIDS AND THEIR PREVENTIVE EFFECT ON LIPID OXIDATION IN FROZEN PERSIAN STURGEON FILLETS

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***Abstract*— Persian sturgeon (*Acipenser persicus*) fillets were soaked in Citric acid, Ascorbic acid and combination of Citric and Ascorbic acid solutions and then were stored at frozen conditions (-18 ºC) up to 6 months. During storage, some general chemical analysis such as free fatty acids, primary and secondary oxidation products and sensory analysis were measured in order to study rancidity development. Results showed that antioxidant treatments had lower (P<0.05) lipid oxidation development in compare with control samples. Development of peroxides value in control samples was significantly higher (P<0.05) than antioxidants treatments after 6 months storage. Also other experiments showed that AA+CA treatment had the best effect (P<0.05) on delaying lipid oxidation in frozen fillets.**

***Keywords*— Antioxidant, Lipid oxidation, Persian sturgeon, Frozen storage, Fillets.**

I. INTRODUCTION

Most fish and other marine species give rise to products of great economic importance in many countries. Freezing and frozen storage have been largely employed to retain fish sensory and nutritional properties before they are consumed or used in other technological processes (Aubourg *et al.,* 2004). Nowadays fatty fish are attracting a lot of attention because the omega-3 poly unsaturated fatty acids, Eicosapentaenoic acid (EPA) and Docosahexaenoic acid (DHA), found in fish oil has important properties in nutrition and disease management. Because of this high unsaturated lipid content, fish products are very susceptible to loss of quality through lipid oxidation (Sánchez-Alonso and Borderias, 2008). Oxidation in food causes a number of changes such as improper changes in the product's sensory properties, decrease of nutritional value and economic losses (Amanatidou *et al*., 2000; Gramza *et al*., 2006). The main phenomenon which affects oil quality in fish during storage is auto oxidation. Some methods such as using low temperature storage, appropriate packaging and glazing with protecting chemicals or antioxidants are used for delaying improper changes in oils (Yildiz *et al*., 2006; Richards *et al.*, 1998; Lin and Lin, 2005; Reynolds *et al*., 2002).

The use of antioxidants is one of the most effective ways of increasing shelf-life and preserving quality of food (Serdaroğlu and Felekoglu, 2005). Antioxidants are substances that can delay or prevent oxidation caused by atmospheric oxygen in fats and oils and fatty components of food (Benjakul *et al.* 2005; Sarkardei and Howel, 2006). Antioxidants can slow down oxidation and rancidity development by reacting with free radicals and stabilizing hydroperoxides (Benjakul *et al.*, 2005).

Ascorbic acid (AA), Citric acid (CA) and their salts are widely known for their role as chelators and acidulants (Oktar *et al.*, 2001; Kim *et al*., 2006). The profitable effects of AA and CA on fish oil and emulsions (Osborn-Barnes and Akoh, 2003), minced fish (Stodolnik *et al.*, 1992) and fish fillets (Badii and Howell, 2002; Aubourg *et al.*, 2004; Pourashouri *et al*, 2006) have been observed.

Sturgeons are one of the oldest freshwater fishes still found living in the world, and Persian sturgeon *(Acipenser persicus*) is one of the most valuable species of them which lives in Caspian Sea. However not enough technological researches exists which accounts for its quality assessment. The present study, investigates the effect of AA, CA and combination of them on lipid stability of Persian sturgeon *(Acipenser persicus*) during frozen storage.

II. METHODS

A. Preparation of fish samples

Fresh Persian sturgeon *(Acipenser persicus)* was captured in October2006 and kept on ice (1h) till delivery to the laboratory. Then, were carefully gutted, dressed and filleted by hand. The weight of each fillet was 500 - 580 g. Fillets were then immersed either in water (blank control; BC treatment), 0.50% AA aqueous solution (AA treatment), 0.50% CA aqueous solution (CA treatment) and in a combination of 0.50% AA and 0.50% CA aqueous solution (AA+CA treatment). After 5 minutes, fillets were removed from all solutions, packaged in individual low density polyethylene bags and placed in a freezer at -40ºC. Antioxidants concentration and dipping time were chosen according to previous related research (Chapman *et al.*, 1993; Aubourg *et al.*, 2004; Pourashouri *et al.*, 2006). Treated fillets were kept in -40ºC for 24 h, and then were stored in a freezer at -18° C. Sampling was undertaken at 1st, 3ed and 6th months after frozen storage at -18ºC and on the raw