Folk Medicine, Pharmacological and Biological Activities

In Morocco, the tubers are consumed during periods of food scarcity and the roots are used in traditional medicine as an emeto-cathartic and against diseases of the respiratory tract. However, the consumption of fresh plants by humans and animals often induces several toxic manifestations, such as irritation of the mucous membranes of the mouth, gastro-enteritis and allergic symptoms, mainly dermatitis and pruritis, and sometimes leads to death (Rakba *et al.*, 2000). Though it is very toxic, in some regions of Algeria, it is used for the treatment of several diseases such as headaches, asthma, flu and it promotes healing of early wound skin lesions (Kadri *et al.*, 2013). It is used, in Italy, as a substitute of *Arum italicum* to heal contusions (De Natale and Pollio, 2007). *A. vulgare* is used as vulnerary and against skin cancer. The signs of the toxicity are irritation of the mucous membrane, oral pain, mouth and pharynx tumefaction, vomiting, intestinal pain and mydriasis. It can produce death by asphyxia (Bnouham, 2012). The seed extract possesses antioxidant activity (Kadri *et al.*, 2013).

The anticancer effect of the two isoloated alkaloids, bgugaine and irniine, has been reported. (-)-*R*-Bgugaine showed a cytotoxic potential against MRC-5 fibroblasts at 10 µg/mL. It activates the outwards K (current) activated by intercellular Ca (Lamkadem *et al.*, 2001). (+)-*S*-Bgugaine (an isomer of *R*-bgugaine, prepared by enantioselective synthesis) showed a cytotoxic potential at 40 µg/mL against MRC-5 cells. It decreases the outward K current (Lamkadem *et al.*, 2000). *R*-Bgugaine and its *S*-isomer exhibited cytotoxic activity on the murine mastocytoma cell line P815 and the human laryngeal carcinoma cell line Hep (Benamar *et al.*, 2009). *R*-Irniine has a cytotoxic potential on MRC-5 fibroblasts at 40 µg/mL and showed no effect on the outward potassaium current (Lamkadem *et al.*, 2004). Also, the cytotoxic effect of *S*-irniine (obtained by synthesis) at 40 µg/mL was detected on MRC-5 fibroblasts (Lamkadem *et al.*, 2005). The two alkaloids bgugaine and irniine exhibited inhibitory effects on the growth of Gram-positive bacteria, yeasts and some filamentous fungi (Melhaoui *et al.*, 1993). Rakba *et al.* (1999) reported bgugaine as a strong hepatotoxin in rat and human cell cultures. Also, irniine induces a significant hepatotoxicity. It induces a significant DNA damage and oxidative stress which leads to cell death by necrosis and/or by apoptosis (Rakba *et al.*, 2000). Both alkaloids may be involved in the toxicological symptoms observed after consumption of the tubers by humans and animals (Rakba *et al.*, 1999, 2000). Iringaine and *N*-methyliringaine were found toxic to brine shrimp larvae (Melhaoui and Bodo, 1995). (-)-*R*-Bgugaine exhibited an important positive response with total inhibition of DNA absorption at 254 nm (Melhaoui and Belouali, 1998).