

an indigenous species and exclusively found in the Uttarakhand, Sikkim, Himachal Pradesh and Ladakh regions of Jammu and Kashmir (Murkute et al. 2011; Warghat et al. 2013).

An extensive survey revealed that *D. hatagirea* is habituated mainly in the Nubra valley (9000–11,000 feet amsl) of the Ladakh region of the Indian Trans-Himalayas. The Nubra valley comprises an acute-angled bend from the valley of Shyok River, further towards the Indus. It is regarded as a cold desert climate characterized by high wind velocity that continues throughout the year, which causes a great variation in temperature (from  $-40^{\circ}\text{C}$  in peak winters to  $35^{\circ}\text{C}$  in peak summers). Further, in Nubra, it is widely distributed in Hunder, Skurru, Skampuk, Turtuk, Bogdang, Tirit, Sumur and Tigger villages near running water source (Murkute et al. 2011; Warghat et al. 2009, 2013).

#### 12.4.1 BIOCHEMICAL COMPOSITIONS

The mature tubers contain mucilage (45%), starch, glucoside, loriglossin, albumen, volatile oil, phosphate (2.7%), chloride; and the ash contains potassium and lime. Five new compounds known as dactylorhin A-E and two natural compounds known as dactyloses A-B have been reported from the roots of this plant. Dactyloses A-B get synthesized from L-ascorbic acid and 4-hydroxybenzyl alcohol via 2-c-(4-hydroxybenzyl)- $\alpha$ -L-xyllo-3-ketohexulofuranosono-1, 4-lactone. However, dactylorhin A and dactylorhin E in enzymatic hydrolysis using almond emulsion give dactylorhin C. Also, dactylorhin D and dactylorhin B in enzymatic hydrolysis using cellulose give a 7a compound (-2-3-dihydroxy-2-2-methylpropyl) butanedioic acid, which in hydrolysis gives Loriglossin.

#### 12.4.2 MEDICINAL PROPERTIES

*Dactylorhiza* leaves contain loriglossin compounds, which help in the peristaltic movement of the gastrointestinal tract, and its tuber contains dactylorhin compounds, which act as neuroprotective agents against dementia, Alzheimer's disease, depression, anxiety and irritable bowel syndrome, and significantly improved the memory when treated with scopolamine, cycloheximide or alcohol (Murkute et al. 2011; Warghat et al. 2009, 2013).

Bulbous roots are used traditionally in the local Amchi system of medicine as an aphrodisiac, expectorant and nervine tonic. Studies conducted with lyophilized aqueous extract of roots on the effect of sexual behaviour and spermatogenesis in male rats revealed that it increases testosterone production by 2.5 folds and subsequently increases the attraction towards females. The tuber of *Dactylorhiza* yields salep that is being used as a sizing material in silk industry. It is used in the treatment of dysentery and diarrhoea. Salep is also used to relieve hoarseness, diabetes, paralysis, convalescence, impotence, malnutrition, etc. salep boiled with milk is being used as a rejuvenating tonic in Ladakh. This plant is famous not only in Ayurveda but also in Amchi, Unani, etc. About 2.5 gm powder of tubers is considered as a full day's diet in adverse conditions by local people. A decoction of salep with sugar and flavoured with spices has got a tremendous nutraceutical value. Mucilage jelly is also