

## ***Phalaris aquatica* L. (phalaris) breeding line PX22: a source of resistance to Mediterranean rusts (*Puccinia* spp.)**

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**Abstract.** A variable breeding population of phalaris has been developed; it is resistant to stem and leaf rusts that attack Australian phalaris cultivars in Israel but that are not yet present in Australia. The population also is seed retaining and low in tryptamine alkaloids. Seed is stored at CSIRO, Canberra.

### **Origin**

Australian cultivars of phalaris are seriously damaged in Israel by various rusts, including *Puccinia graminis* f. sp. *phalaridis* (stem rust) and *P. coronata* f. sp. *phalaridis* (crown rust) (Katznelson 1977; Dinooor *et al.* 1988). The rust resistant cultivar Noy was based on 12 productive ecotypes selected from a set of 150 accessions after these were exposed to natural rust infestations in Israel (Katznelson 1977). As a safeguard against damage to phalaris in Australia if pathogenic rusts gain entry to Australia, and to develop seed-retaining material for selection in Israel, a cooperative program was conducted at Neve Ya'ar, Israel, and Canberra, Australia, between 1978 and 1986. In Australia, seed-retaining hybrids between the progenitors of Uneta and Sirolan were crossed with Noy, and 16 seed-retaining F<sub>2</sub> plants with reduced tryptamine alkaloid content were isolated and intercrossed amongst themselves at random. The relative genetic contributions of cvv. Uneta, Sirolan and Noy to this population were 0.375, 0.446 and 0.179, respectively. Rust-resistant individuals were identified in Israel following spray inoculation of the plants on 4 occasions in both 1982 and 1983. A fully resistant plant was found in each of 10 families. These were inter-pollinated at random, and seed of each plant was returned to Canberra for yield, flowering time, and seed retention evaluation. A total of 120 plants was selected and intercrossed to found the breeding line 'Polycross 22' (PX22), which was further seed-increased in an isolated field plot. The resultant seed was dried, sealed in moisture-proof tins and has since been stored in a cold-room at 2–4°C at CSIRO Plant Industry.

### **Morphological description**

PX22 is a member of the winter-active group of phalaris cultivars, having erect, sparse, thick tillers. Under spaced plant conditions near Canberra, PX22 was similar to Sirocco, Sirolan and the United States cultivar, Oasis, in flowering

time, 1–2 days later than Noy and 2–4 days earlier than Australian and Uneta. At maturity, PX22 was 6 cm taller than Noy and Oasis, similar in height to Siroso, 4 cm shorter than Sirolan and 20 cm shorter than Sirocco. In winter, most PX22 plants had long, broad leaves like those of Sirocco and Sirolan, whereas Australian and Uneta had fine leaves, and Siroso, Noy and Oasis plants varied from fine to broad. The origins and characteristics of these cultivars are tabulated in Carlson *et al.* (1996). Although stem rust sometimes attacks phalaris in Canberra, PX22 has not been exposed to an outbreak, so its reactions to the local races are unknown.

### **Agronomic characteristics**

PX22 is regarded as a unique, variable, genetic resource from which resistant cultivars could be selected over a few generations if Mediterranean rusts invade Australia. It has not been evaluated extensively in the field in its present variable condition. In a 3-year spaced plant trial near Canberra, PX22 had a lower yield score than Sirolan in mid-winter, but a higher score than Noy, Siroso, Sirocco and Oasis, and a much higher score than Australian and Uneta.

### **Note**

'Germplasm' is defined as an improved breeding population or collection in which some valuable, novel trait(s) has been intensified by selection, but which lacks some characteristic essential in a cultivar. The complete definition is in Oram (1990; p. 2).

### **References**

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