Registration of ‘Premier’ Spring Rapeseed

‘Premier’ spring rapeseed [Brassica napus L. subsp. oleifera (Metzg) Sinsk. L. annua] (Reg. no. CV-23, PI 639274) was developed for use as an edible oil–quality rapeseed (canola) cultivar and released by the Idaho Agricultural Experiment Station in December 2002.

Premier is a near homozygous pure-line spring edible oil–quality rapeseed (canola) cultivar selected for a special oil characteristic (low linolenic acid content) and good adaptability to environments throughout the Pacific Northwest Region (Idaho, Oregon, and Washington). This cultivar was developed from a single plant selection made in 1995 from a near homozygous F2 population derived from the cross ‘Westar’/‘DNK.89.213’. Westar is a canola cultivar released by Agriculture Canada in 1982 with canola quality oil and meal (<20 g kg\(^{-1}\) erucic acid in the oil, and less than 30 μmol g\(^{-1}\) of glucosinolate in the defatted seed meal). DNK.89.213 is a canola quality breeding selection from Dansk Planterforædling, Denmark. F3 seed from the original hand cross-pollination was produced in the spring of 1992. Progeny from the cross were evaluated in a multivariate cross prediction trial (Pooni and Jinks, 1978) in the glasshouse in 1992 (F1 to F2 seed) and in the field in 1993 (F2 to F3 seed). Based on the cross prediction studies, progeny from this cross were identified as having a high potential for producing desirable recombinant inbred lines. Characters in the prediction study analyses included seed yield, early flowering, and oil content. Plants from 32 F2 single plant selections were grown in an F3 head row cross prediction trial in the field in 1994. At harvest, seed of the most productive single plant plots (based on harvested seed yield) were planted in F4 bulk yield trials at two locations in 1995. In addition, a sample of the F4 bulk seed was selected for seed increase. At harvest, 200 single plants were selected from the increase plot. These plants were threshed on a plant-by-plant basis and fatty acid content was determined for each using a procedure similar to Christie et al. (1992) and Hammond (1991). The lines with the highest oil content, less than 5 g kg\(^{-1}\) erucic acid content, and less than 40 g kg\(^{-1}\) linolenic acid content were bulked for F5 field trials in 1996. Seeds from the “best” six F5 plant selections were planted separately to initiate an elite seed increase.

Breeder seed of Premier was derived from single plants selected from an F6 population grown in the field in 1998. Seeds from the initial selections were grown as head-row plots in 1999 and before harvest 100 single plant selections were identified with the desired uniformity and quality. In 2000 and 2001, this operation was repeated and after the 2001 harvest a total of eight single plant progenies were selected with the desired oil quality. Before harvest, twenty single plant selections were taken from each head-row and evaluated for quality characters. One hundred twenty single F6 plants were selected to plant Breeder seed in 2002. During the growing season of each year’s increase, head row plots were visually inspected and any off-type plants were removed.

The performance of Premier was evaluated in field trials performed between 1999 and 2003. The trials were planted in Idaho, Washington, Oregon, and Montana in regions where spring canola has shown commercial potential. Ten to 13 locations were planted each year. The performance of Premier was compared to the commercially available spring canola cultivars Westar, Profit, Hyola.401, and Sunrise. Westar is an industry standard canola cultivar released by Agriculture Canada in 1982. Profit was also developed by Agriculture Canada and is included as a standard for high oil content. Hyola.401 is a high yielding Polina CMS based hybrid cultivar developed by Zenica/ICI, and Sunrise was developed at the University of Idaho and released in 1996 (Brown et al., 1997). Hyola.401 and Sunrise have been grown commercially in the Pacific Northwest region for the past 5 yr. Seed yield of Premier was medium to high and relatively consistent over a range of environments that exist throughout the Pacific Northwest region. Seed yield was significantly higher than Westar and Profit, not significantly different from Sunrise, and significantly lower than the high-yielding hybrid cultivar Hyola.401. Averaged over 59 site–years between 1999 and 2003, the yield of Premier was 1785 kg ha\(^{-1}\), compared to Hyola.401, Sunrise, Westar, and Profit with 2076 kg ha\(^{-1}\), 177 k g ha\(^{-1}\), 1675 kg ha\(^{-1}\), and 1631 kg ha\(^{-1}\), respectively. The lowest seed yields were obtained from low rainfall regions so Premier would not be recommended for planting in areas with less than 40 cm of annual rainfall.

Oil content of Premier was high (398 g kg\(^{-1}\)), but not significantly different from the high oil cultivar Profit. Oil content of Premier was significantly higher than Hyola.401 and Westar.

Premier was selected as an adapted cultivar with high oil content and low linolenic acid content in the seed oil. Premier has lower linolenic acid content (35 g kg\(^{-1}\)) than Sunrise (101 g kg\(^{-1}\)). The reduction of linolenic acid in Premier results in an increase of linoleic acid (204 g kg\(^{-1}\)) and a slight increase in oleic acid (667 g kg\(^{-1}\)).

Aliphatic glucosinolate content of Premier defatted seed meal was 12.0 μmol g\(^{-1}\), which was significantly higher than the low glucosinolate cultivar Sunrise, but well within the canola standard of less than 30.0 μmol g\(^{-1}\). The primary aliphatic glucosinolate types were 2-hydroxy-3-butenyl glucosinolate (7.3 mol g\(^{-1}\)) and 3-butenyl glucosinolate (4.2 μmol g\(^{-1}\)). The glucosinolate profile was very similar to Sunrise and other cultivars examined.

Premier has moderate to good seedling establishment, and significantly better than Westar and Profit. Premier reached 50% bloom on average 56 d after planting, which was 3 d later than Hyola.401 and 1 d earlier than Sunrise and Profit. Average plant height of Premier was 130 cm at maturity compared to 114 cm and 138 cm for Hyola.401 and Sunrise, respectively. Premier is resistant to lodging and moderately resistant to spring frost and is susceptible to triazine and other broadleaf herbicides. Plants mature on average 107 d after planting.

Seed cotyledons of Premier are medium in size (similar to ‘Primor’) and the seedling habit is prostrate at the leaf rosette stage. Stem anthocyanin is absent. Leaves are medium green and nonglaucous. Leaf margins are medium (no serration), lobing is absent, and leaf attachment to the stem is partially clasped (similar to ‘Jet Neuf’). Flowers and flower buds are located at the tip of the apical meristem. Flowers are bright yellow and anther dotting is absent. Bilateral single silique has a semierect habit. Silique length and breadth are both medium with a short silique beak and short pedicle length. Siliques contain a high number of dark brown–black seeds. Seed size is medium with an average 1000-seed weight of 3.7 g, 0.2 g heavier than the cultivar Westar.

Seed increases of Premier are limited by Plant Variety Protection (PVP Certificate no.) to Foundation and Certified Seed classes. Requests for seed of Premier for either experimental or commercial production can be made to the Idaho Agricultural Experiment Station, University of Idaho, Moscow, ID 83844–2351. Small amounts (1–25 g) of Premier seed for experimental purposes can be obtained from the corresponding author for at least 5 yr.

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References