Written testimony about SB789
James R. Myers, Ph.D.
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Chair Helm and Members of the Committee, my name is Dr. Jim Myers. I hold the Baggett-Frazier Endowed Chair of Vegetable Breeding in the Department of Horticulture at Oregon State University. I have more than 25 years' experience in breeding Brassica vegetable crops, primarily broccoli. I would note that my testimony represents my personal views and is not necessarily the opinion of College of Agriculture at Oregon State University.

I support SB789. I am very concerned that if the current regulations established by SB885 are allowed to sunset on June 30 without legislation to replace it, we would see unfettered production of canola that would could severely impact Brassica vegetable seed production in the Willamette Valley.

I am in general agreement with the findings and recommendations in the Final Report - House Bill 2427 based on research conducted by Dr. Mallory-Smith, specifically that isolation distances and pinning are required for canola crops. I hope that my testimony can clarify some points of discussion and add additional perspective.

I sympathize with farmers who are looking for alternatives in their crop rotation that match with their production cycle that are not cereals or grasses, but I have given the problem long and hard consideration and have not been able to identify crops that would be ideal as alternatives.

Some have asked why do we need to regulate canola when crops such as turnip and radish grown as cover crops are not. When grown for cover crops, the plants are not allowed to reproduce before being plowed down and do not constitute a threat to seed crops. If the final product of the crop is seed, whether for commercial use or seed, then coordination among growers is required.

Several factors coalesce to make the case of canola production in the Willamette Valley so problematic. These involve the unique environment, the reproductive biology of Brassica species, the shared vulnerability to various pests and diseases, and very nature of agricultural production of Brassica species. I will address the factors in more detail.

Environment: The Willamette Valley has approximately 3.4 million acres but only about 1.6 million is arable and would be farmland potentially available for canola production. This is further restricted by the acreage occupied on an annual basis by Brassica seed crops such that only about 53,000 acres might have the potential for canola production. Attachment 4-9 of Final Report – House Bill 2427 (Mallory-Smith et al., 2017) has WVSSA maps for radish and Brassica seed production from 2012 – 2017 in the Willamette Valley. These are drawn with 3-mile buffers around production fields, which provides a visualization of what remaining acreage would be available for canola production.

Very few places around the world exist which have the combination of climate and agricultural resources for Brassica seed production. These tend to be Mediterranean climates with mild wet winters and dry summers. In addition to the Pacific Northwest, areas include parts of Chile, New Zealand, Australia, and Mediterranean Europe. These regions tend to be small and vulnerable to outside influences. Our region produces over 90% of cabbage, brussels sprouts, rutabaga and turnip seed, and 20-30% of global radish and Chinese cabbage seed.

Reproductive biology: Canola is a form of rapeseed. Some types of rapeseed are high in Erucic acid and not suitable for human consumption; canola has been bred for low erucic acid levels. Canola consists of two species*: Brassica napus* and *B. rapa*. Most winter canola is the former species with *B. rapa* canola used mainly for spring production.

Brassica napus shares a genome each with *B. rapa* and *B. oleracea* (Myers, 2006). Some Brassica vegetables are the same species as canola and will cross readily including the *B. napus* vegetables Rutabaga and Siberian or Russian Kale. *B. rapa* vegetables include Chinese or Napa cabbage, Broccoletto, Komatsuna, Mizuna, Mibuna, Pak Choi, Tai tsai, Tat soi, Pe tsai, Wutacai, and Turnip. *B. oleracea* Cole crops include Broccoli, Brussels Sprouts, Cabbage, Cauliflower, Collards, Kale, Kohlrabi, Kailan (Gai Lan) and Tronchuda.

There is little quantitative data apart from Michael Quinn's, Ph.D. thesis (2010) to provide local estimates of how often outcrossing does occur when interspecific hybridization is rare. He found outcrossing between *B. napus* and *B. rapa* but no outcrosses from *B. napus* x *B. oleracea* crosses. <u>Bottom line:</u> Spontaneous crosses between *B. napus* and *B. rapa* are common and will happen in the field, but those between *B. napus* or *B. rapa* and *B. oleracea* are rare and not likely to be a concern in the field. While progeny from crosses between *B. rapa* and *B. oleracea* are rare, it does happen and is what gave rise to the *B. napus* as a species (Myers, 2006). Some cultivars may cross with other species more readily than others, so it can be difficult to generalize about entire species relationships.

Outcrossing will be dependent on environmental conditions and pollinator density and diversity. While insects move most pollen, canola pollen can be wind borne for up to 2km (Myers, 2006). An important consideration is whether canola will be flowering at the same time as the vegetable seed crop. Some vegetable crops are annuals (most Asian vegetables, some Cole crops) whereas others are biennial (most of the Cole crops, some Asian vegetables, rutabaga and Siberian kale). Flowering time in annuals is more likely to overlap with spring canola whereas that of biennials is more likely to overlap with winter canola.

Weedy persistence, pests and diseases: Dr. Mallory-Smith and colleagues did not find evidence of an increase in pests and diseases associated with experimental canola during their study (Mallory-Smith et al., 2017). This is not surprising given that the acreage was relatively small and only recently introduced. Inevitably, when a new crop is introduced into a new region, it usually has very few pests and diseases. But as acreage expands and the number of years increases, disease and insect pests will build up. This is particularly true of root rots and some foliar diseases as well as some insect pests. It is a gradual process and the grower may not even be aware of what is happening until a decade later when it becomes obvious that the yields originally attained are no longer achievable. Short crop rotations will exacerbate the problem. I would expect the introduction of canola to follow a similar pattern where as the acreage increases, pests and diseases will follow. In addition to the pests and diseases that are specific to Brassicas, I would single out the fungal disease white mold (*Sclerotinia sclerotiorum*) because it is a generalist and infects over 400 plant species (Bolton et al., 2006). It is already a problem in processing snap bean and clover seed fields in the valley. Canola is very susceptible to this disease and will facilitate its spread (Paulitz et al., 2015).

Where canola acreage has increased near vegetable seeds in Europe, seed production has disappeared. This has been attributed to an increase in insect pests accompanying expansion of the canola acreage. An example is that in southern France where *B. oleracea* cabbage seed was being produced, thrips populations increased with the introduction of canola. Male cabbage inbreds used for F_1 hybrid seed production are weak pollen producers, and thrips pollen consumption reduced seed yields to uneconomical levels. A similar situation reported by Rijk Zaan in a letter submitted as part of testimony to HB 2427 was that in central France, an increase in flower beetles (*Melighetes aeneus*) damaging radish flower buds and reducing pollen production, making it infeasible to produce hybrid seed.

Dr. Mallory-Smith et al. (2017) did not find much evidence of weedy persistence of canola, but others have found a high degree of weediness with this crop. It is essential that canola production be monitored to prevent volunteers in fields and along roadways. Equipment moving between fields needs to be thoroughly cleaned. Roundup resistant GE canola has been documented growing along roadways in California where university trial equipment was transferred between research locations and where the highway department sprayed roadsides with Roundup (Munier et al., 2012).

Brassica seed and crop production: Canola seed is small and, in any quantity, behaves more like a liquid than a solid. To prevent contamination along roadsides, it would need to be transported in water-tight containers. Most Brassica crops have similar sized seed and it is impossible to separate mixtures in a harvested seed lot. This can be a problem in other small seeded crops such as clover. Primary source of contamination would come from improperly cleaned equipment or volunteer plants in the field.

Adventitious presence of the Roundup Ready trait (genetically engineered glyphosate resistance) in canola is a threat to vegetable seed producers. Studies in Canada found that 33% of conventional seed lots tested by Friesen et al. (2003), and 18% of the seed lots tested by Downey and Beckie (2002) had the Roundup Ready transgene present at levels above 0.25%. There are no recent studies to determine what levels of adventitious presence are in contemporary US seed lots of conventional canola. I would recommend testing conventional canola seed lots for adventitious presence prior to planting.

If high erucic acid rapeseed were grown in the Willamette Valley an additional concern for vegetable seed producers would be erucic acid contamination through outcrossing. Contamination of vegetable seed crops with canola may alter flavor by modifying glucosinolate profiles. Contamination of canola by vegetable Brassicas may reduce oil production and composition.

Because the seed is small and Brassica seed crops have a high multiplication ratio (~1:400), seed production fields have a relatively small footprint. Production can be scaled quickly with an acre producing on average a ton of seed, which can be used to plant about 4,300 acres of Chinese cabbage, 11,000 acres of broccoli and almost 15,000 acres of cabbage. Very few tons of seed of each crop would meet the annual seed needs of the entire U.S. This makes the Brassica seed industry very vulnerable to shocks to the system. Relatively minor effects at the seed production level can have profound consequences at the commercial production level. We should do all that we can to ensure that the Brassica seed industry in Oregon has a stable production environment.

References

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