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# Assessment of Resistance Management Education and Experience of Educators and Growers in the Northeast

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## Assessment of Resistance Management Education and Experience of Educators and Growers in the Northeast

Hilary Sandler<sup>1</sup>, Laura McDermott<sup>2</sup>, Katherine Ghantous<sup>1</sup>, and Dahlia Medeiros<sup>1</sup>

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In September 2014, the UMass-Amherst Cranberry Station and Cornell University distributed a survey to vegetable and small fruit growers, Northeastern Extension personnel and agricultural professionals to assess their experience and perspectives regarding Resistance Management (RM) and pesticide Modes of Action (MoA). Completed surveys from 16 growers (44% response rate) and 56 educators (50% response rate) throughout the New England region were returned.

**Frequency and Confidence of Training Materials.** Educators were asked to describe how often they offered courses dedicated to RM and pesticide MoA and to rank their level of confidence in their teaching materials. The reported status of outreach delivery indicated that there is room for improvement. Less than 40% of all educators surveyed offered RM programs with any regularity and only 25% of the educators regularly offered pesticide MoA courses. Moderate confidence in their RM teaching materials was reported by 36%; 25% rated their RM materials as “good” or “excellent”. The remainder (39%) reported “little” to “no” confidence in their educational materials on RM. Similarly, nearly half of educators (47%) said they had “little” to “no” confidence in their current suite of MoA education materials; only 4% considered their teaching materials on MoA to be excellent.

**Self-Assessment of Knowledge.** Both groups were asked to self-assess their knowledge of RM and MoA. Even though less than half of educators offered RM and MoA programs and had only moderate confidence in their teaching materials, almost half of the educators (44%) considered their knowledge of RM to be “good” to “excellent”; only 12% reported “very little” to “no” RM knowledge (Fig. 1A). Educators were not as confident in their knowledge of MoA as they were of RM (Fig. 1B). Only 22% of educators said that their knowledge of MoA was “good” to “excellent”, 28% assessed their knowledge as “fair”, 40% reported “very little” understanding, and 7% of educators reported no understanding of MoA. When asked about specific pesticide groups, respondents reporting “little” or “no” knowledge on herbicide, fungicide, and insecticide MoA was 60%, 42%, and 38%, respectively (data not shown). Less than one-third of education respondents reported “good” or “excellent” knowledge on fungicide (31%), insecticide (25%), and herbicide (21%) MoA.

More than two-thirds of growers (69%) self-assessed their knowledge of RM to be “good” or “excellent” (Fig. 1A). Growers were also asked to assess their MoA knowledge in general. Much like educators, growers rated their knowledge of MoA lower than that of RM (Fig. 1B). Growers self-assessed their knowledge of MoA higher than the self-assessment of educators with 45% of growers reporting their knowledge of MoA was “good” to “excellent” (vs. 21% for educators), 31% assessed their knowledge was “fair”, 21% reported “very little” understanding (vs. 40% for educators).

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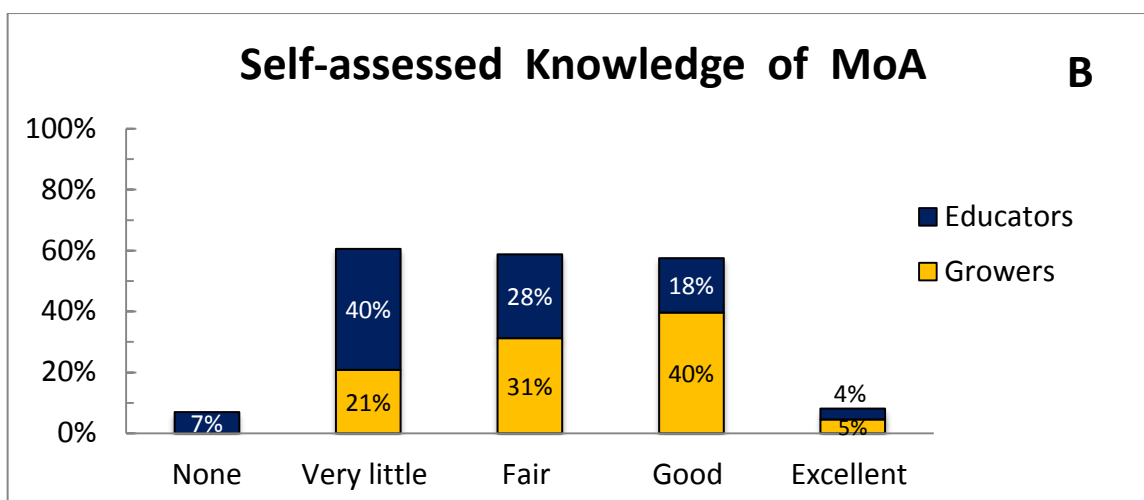
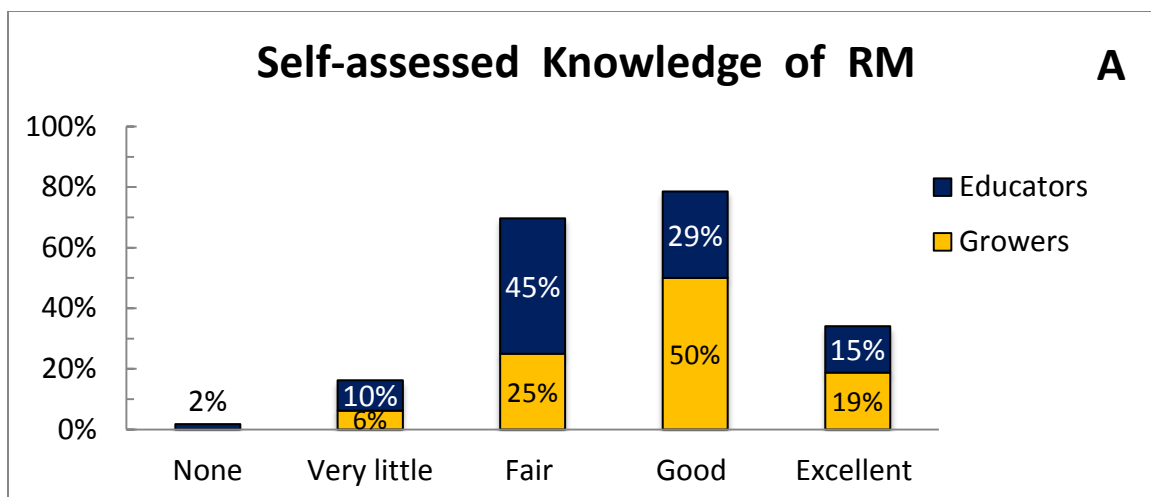


Fig. 1. Percentage of educator's and growers' reported self-assessment regarding their knowledge of A) Resistance Management (RM) and B) Modes of Action (MoA) for pesticides (in general).

**Preparation and Motivation to Teach.** Respondents were asked to report how *prepared* they felt to teach RM and MoA information, how *motivated* they were to learn about the topics, and how *willing* they were to teach on the subjects. Although 88% of educators rated their knowledge on RM as moderate to excellent, only 13% felt that they were “highly” prepared to teach on the subjects of RM and MoA (data not shown). Perhaps this is due to the lower confidence of their knowledge in MoA, or the lack of prepared education materials (see Page 1). Motivation to learn about both topics was strong with 39% and 52% highly and moderately motivated, respectively (data not shown). Willingness to teach RM or MoA information was slightly lower than the motivation to learn with 33% and 48% “highly” and “moderately” willing, respectively. This may be a reflection of the desire to increase their knowledge on the subjects prior to teaching others.

**Past and Preferred Learning Methods.** Most educators learned about RM through interaction with colleagues (34%) or were self-taught by reading (28%; Fig. 2A). Few attended professional development courses or took a full-semester college course on the subject (4%). Four times as many educators took full-semester college courses in pesticide MoA (16%) than RM (Fig. 2B). However, most received their

MoA training via self-teaching through reading (45%) or interaction with colleagues (18%). Not surprisingly, growers received training on RM and MoA in different ways than educators. The majority of growers' training (56%) in RM was through occasional workshops (Fig. 2A). Grower training on RM was distributed evenly between full-semester courses, self-teaching through reading, and interaction with agricultural advisors and other farmers (13% each), and the remaining 6% had no training in RM whatsoever. Growers' education in pesticide MoA was very similar to their RM training except more reported self-teaching of MoA through reading (25% vs. 13%) and fewer (44% vs. 56%) attended MoA workshops (Fig. 2B) compared to learning about RM.

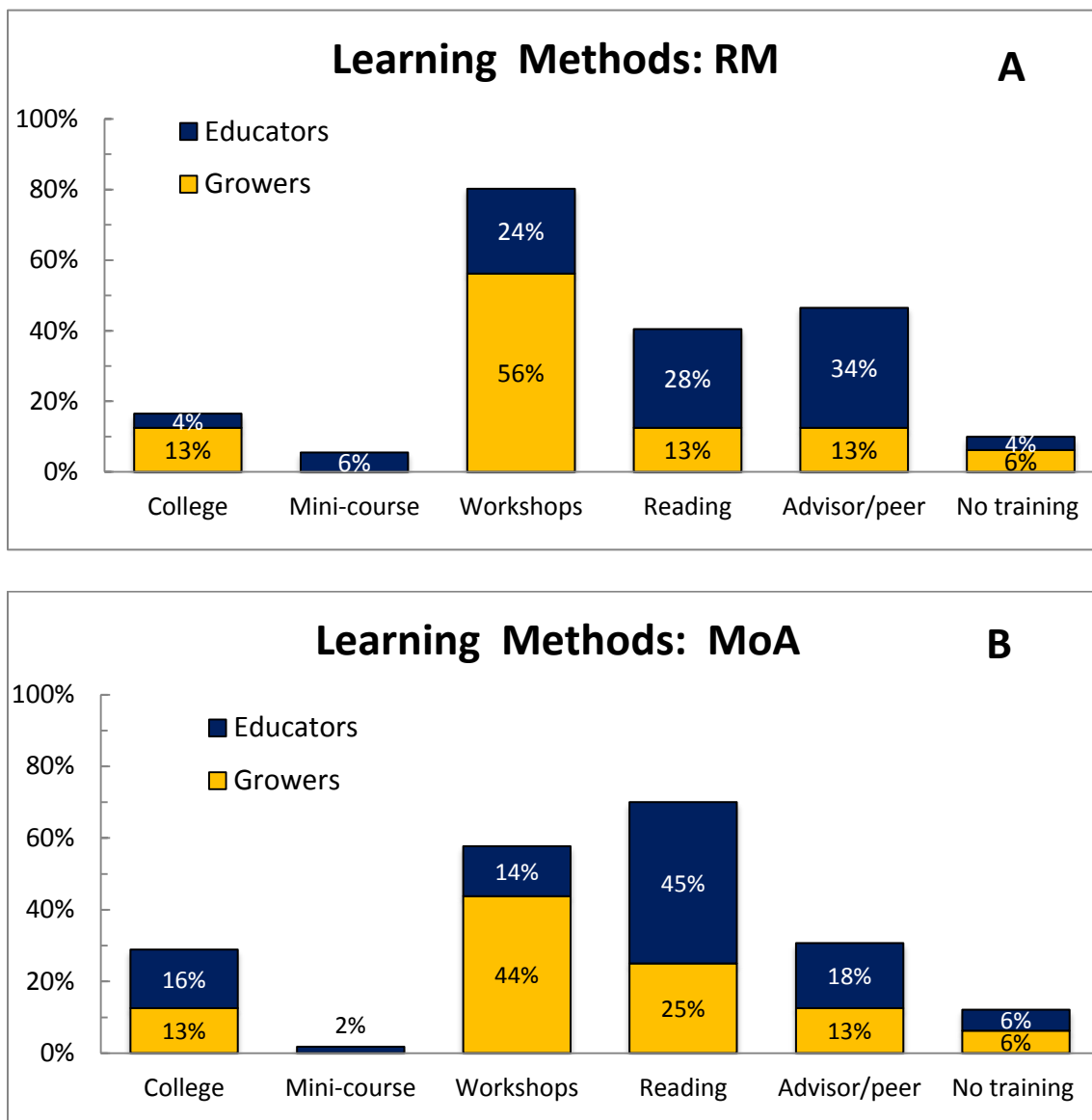


Fig. 2. Percentage of educators and growers who received their knowledge of A) Resistance Management (RM) and B) Modes of Action (MoA) for pesticides. Choices were: full-semester college course, professional development mini-course, occasional workshops, self-taught by reading, interactions with agricultural advisors and/or peers, and no training.

For future learning, educators said that their preferred method of learning about the subject of RM would be through workshops (74%) and webinars (60%; Fig. 3). Fewer than half said they would be open to other suggested methods of learning. Educators believed that growers would prefer education through workshops (80%) as well. Other methods perceived as popular for growers by educators were extension field days (74%), and one-on-one interaction (67%). Only 14% of educators thought growers would share their interest in learning through webinars. As educators predicted, most growers wanted to learn about RM through workshops (88%). However, unlike educators predicted, growers expressed interest in learning via webinars (38%) and formal classes (31%). About one-third of growers liked extension field days and one-on-one interactions for learning venues. Educators should expand the variety of grower-education platforms when delivering programs on RM and pesticide MoA education.

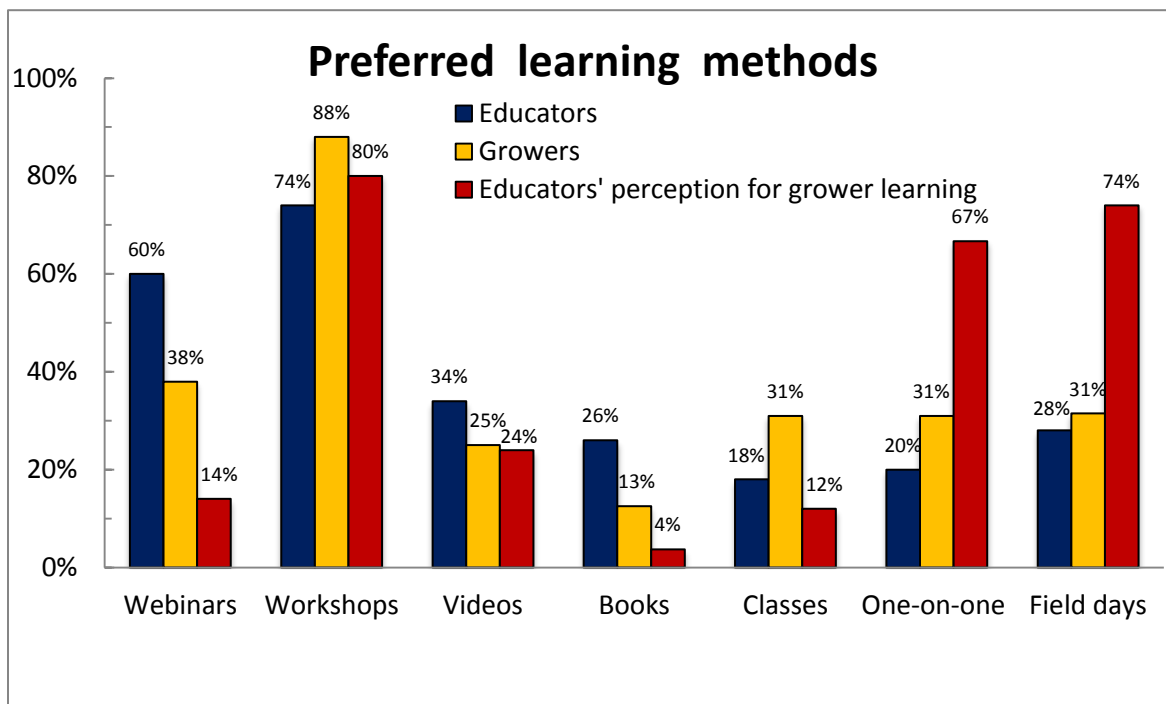


Fig. 3. Percentage of educator and grower respondents' preferred methods for future learning events about RM and educators' perception of growers' preference for learning.

**Concern about RM.** Nearly all educators considered themselves to be “very concerned” (46%) or “concerned” (46%) about pesticide RM issues; only 6% were “marginally concerned” and 2% not concerned (Fig. 4). Educators believed that growers were concerned about the topic of pesticide RM, but that the severity of the growers’ concern was less than their own. They believed that only 10% of growers would be “very concerned”, 47% as being “concerned”, 35% “marginally concerned”, and 7% “not concerned”. Educators were incorrect in the assumption that growers were not seriously concerned. Growers reported quite a bit of concern regarding RM issues. When asked about four specific resistance issues, just 37% of growers were “concerned” or “very concerned” about the appearance of herbicide-resistant weeds, but 94%, 81%, and 56% of grower respondents were “concerned” or “very concerned” about the disappearance of effective pesticides, increased pesticide in the environment coming from resistance problems, and increased pesticide usage, respectively (Fig. 5).

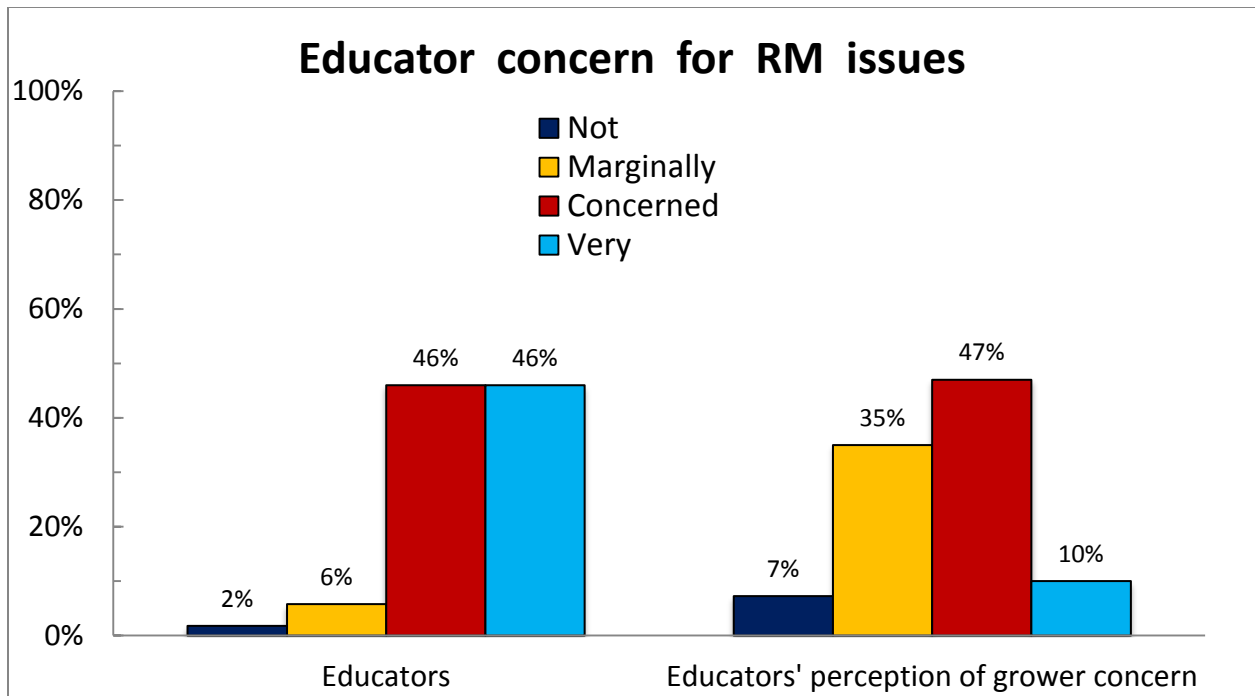


Fig. 4. Reported concern about RM issues in general by educators and educators' perceived concern about RM by their stakeholders.

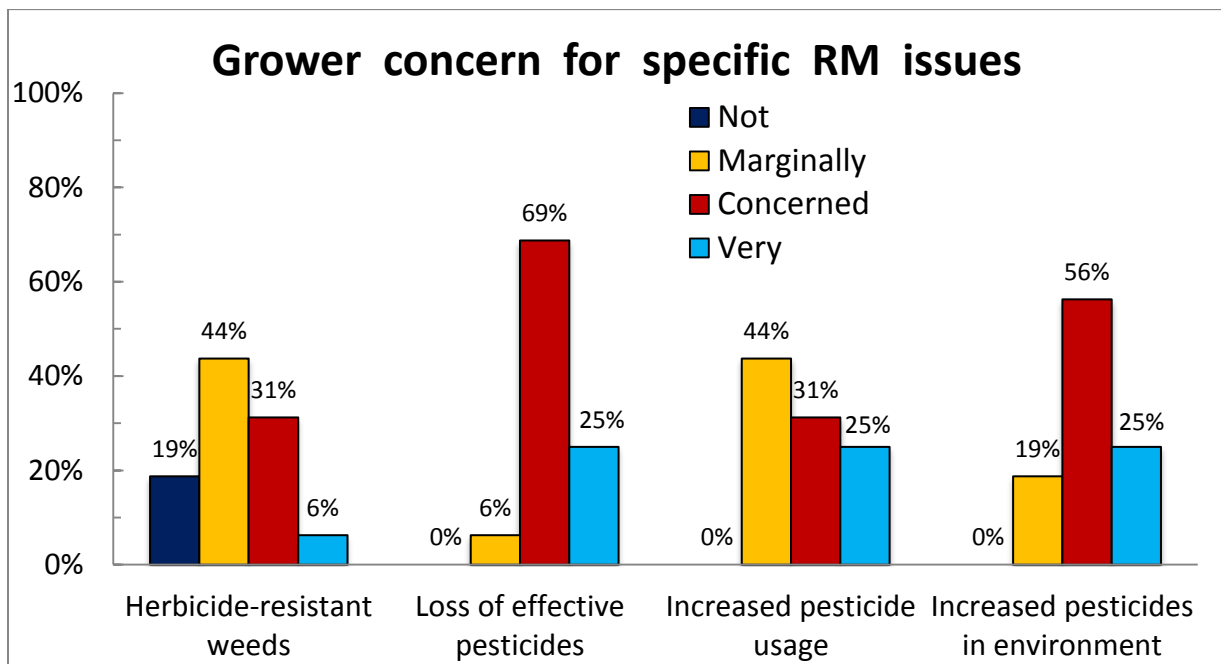


Fig. 5. Percentage of growers reporting concern on 4 specific issues: the appearance of 'super weeds', disappearance of effective pesticides, increased pesticide use on farm, and increased pesticides in the environment due to resistance problems.

**Crops grown and crops with potential resistance problems.** Grower respondents produced a variety of crops (Fig. 6). Most growers produced more than one crop. Small fruit (berries) were identified by half of the growers as possibly having pest resistance issues (Fig. 7).

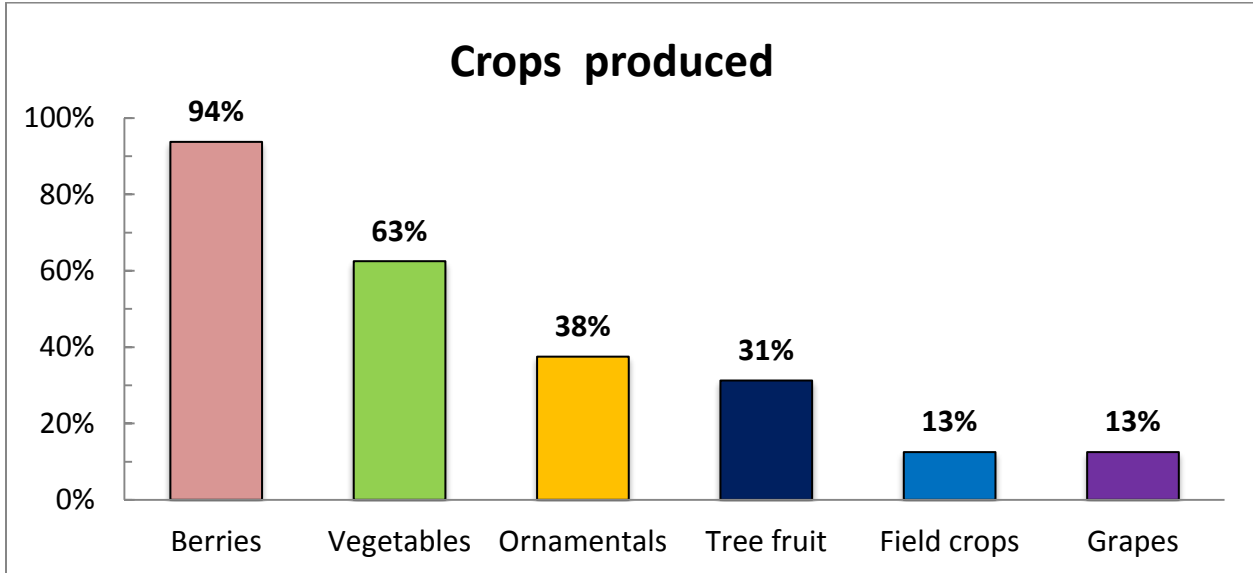


Fig. 6. Percentage of growers reporting crops grown on their (diversified) Northeast farms.

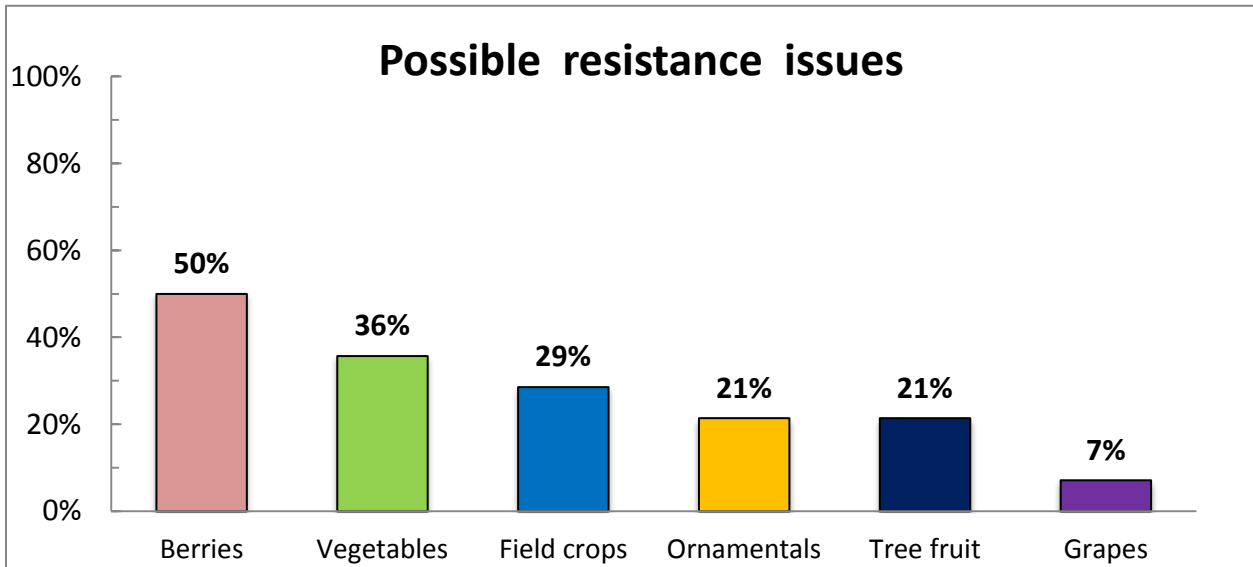


Fig. 7. Percentage of Northeast growers who identified each crop group as possibly having pest resistance issues.