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***INTEGRATED CROP AND WEED MANAGEMENT SYSTEMS***

**NON-TECHNICAL SUMMARY:** The goal of this program is to develop and apply innovative and contemporary tools of crop science to address the challenges and opportunities facing the agricultural industry of Washington. Program scientists will determine the morphological, physiological, crop yield and crop quality responses of critical regional crops including cereal, small fruit, and vegetable crops, to management practices such as grafting, tillage, planting method, fertilization, irrigation, plant growth regulators, herbicides, and residue management, and use the knowledge gained to refine current or develop new production practices.

**OBJECTIVES:** The goal of this program is to develop and apply innovative and contemporary tools of crop science to address the challenges and opportunities facing the agricultural industry of Washington. Program scientists will determine the morphological, physiological, crop yield and crop quality responses of studied crops to management practices such as grafting, tillage, planting method, fertilization, irrigation, plant growth regulators, herbicides, mulches, and residue management, and use the knowledge gained to refine current or develop new production practices. Increase horticultural crop options for farmers by: Investigating and developing effective sustainable vegetable production systems, with a focus on high-value crops suitable for fresh market production. Evaluating impact of production systems on vegetable crop quality and yield. Improving quality and quantity of vegetable seed and berry crops by integrating weed management and crop production strategies. Determine the agronomic and economic potential of diverse and flexible no-till and conservation-till eastern Washington cropping systems for dryland compared to traditional tillage intensive systems. Evaluate conventional and alternative biologically-based weed management options to increase efficacy and cost-efficiency of grain and horticultural crop production systems.

**APPROACH:** Program scientists will determine the morphological, physiological, crop yield and crop quality responses of studied crops to management practices such as grafting, tillage, planting method, fertilization, irrigation, herbicides, and residue management, and use the knowledge gained to refine current or develop new production practices. Researchers will develop and promote strategies for refining crop management practices for crops throughout Washington, with specific emphasis on regionally important or developing crops; developing and incorporating weed

management approaches for the various cropping systems found in Washington; and using alternate crops as appropriate for diversifying cropping systems for production and pest control. Researchers will develop a comprehensive understanding of the morphological, physiological and or genetic basis for crop and weed responses in studied management systems to: nutrients; temperature, moisture and other abiotic stresses; herbicides; and attack by other organisms. Investigators will work with plant breeding and genetics colleagues to release new varieties for general public and or licensed release and develop new information on best management practices. Project participants will use specific project appropriate laboratory, growth chamber, greenhouse, small plot, field scale and landscape level research methods and procedures. Certain collaborations will be developed as needed, particularly with entomologists, plant pathologists, sociologists, and economists. Finally, project investigators will work to secure outside funding to accomplish these activities.

**KEYWORDS:** Cereals; Small fruit; Vegetables; Rotation; Pest management

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