# Vipan Kumar

Assistant Professor of Weed Science (100% research appointment)
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## I. EDUCATION:

Ph.D. Plant Science-Montana State University, Bozeman, MT (May 2015)
M.S. Agronomy-Louisiana State University, Baton Rouge, LA (May 2011)
B.S. Crop Science-Punjab Agricultural University, Punjab, India (Aug 2008)
Diploma in Agriculture (2-yr program)-Institute of Agriculture, Punjab, India (Aug 2004)

## II. APPOINTMENTS:

| | |
|---|---|
| Sep 2017-present | Assistant Professor of Weed Science<br>Agricultural Research Center-Hays<br>Kansas State University, Hays, KS |
| Oct 2018-present | Associate Faculty<br>Department of Plant and Soil Sciences<br>Oklahoma State University, Stillwater, OK |
| Mar 2019-present | Adjunct Faculty<br>Department of Agricultural Biology<br>Colorado State University, Fort Collins, CO |
| Jun 2015-Aug 2017 | Postdoctoral Research Fellow<br>Southern Agricultural Research Center<br>Montana State University, Huntley, MT |
| Jun 2011-May 2015 | Graduate Research Assistant (Ph.D. Student)<br>Montana State University, Huntley, MT |

## III. A. RESEARCH AND OUTREACH ACTIVITIES:

### *Total Peer-Reviewed Publications*: *52*

| Google Scholar Citation Indices | All | Since 2016 |
|---|---|---|
| **Citations** | 671 | 643 |
| **h-index** | 15 | 15 |
| **i10-index** | 24 | 24 |

***Graduate Student, Visiting Scholar, Assistant Scientist or Ag Technician of Dr. Kumar**

1. Brunharo CACG, Gast R, **Kumar V**, Mallory-Smith CA, Tidemann BD, Beckie HJ (2021) Western United States and Canada perspective: Are herbicide-resistant crops the solution to herbicide-resistant weeds? Weed Sci. (In-Review)
2. Perumal R, Tesso TT, Jagadish SVK, **Kumar V**, Aiken RM, Bean S, Smolensky D, Peiris KHS, Prasad PVV, Little CR (2021) Registration of grain sorghum seed (A/B) and pollinator (R) parent lines for chilling and drought tolerance. J Plant Reg. (In-Review)
3. Manuchehri MR, Childers JT, **Kumar V**, Ochsner TE (2021) Sensitivity of non-tolerant winter wheat to quizalofop-p-ethyl in central Oklahoma and Kansas. Weed Technol. (Accepted, In-Press)
4. *Liu R, **Kumar V**, Jha P, Stahlman PW (2021) Emergence pattern and periodicity of Palmer Amaranth (*Amaranthus palmeri*) populations from southcentral Great Plains. Weed Technol. DOI: 10.1017/wet.2021.81
5. *Liu R, **Kumar V**, Jhala AJ, Jha P, Stahlman PW (2021) Control of glyphosate/mesotrione-resistant Palmer amaranth (*Amaranthus palmeri*) in glyphosate/glufosinate-resistant corn. Agron. J. doi: 10.1002/agj2.20770
6. **Kumar V**, *Liu R, Jhala AJ, Jha P, Manuchehri MR (2021) Palmer amaranth control in postharvest wheat stubble in Central Great Plains. Weed Technol. DOI:10.1017/wet.2021.64
7. Lim CA, Jha P, **Kumar V**, Dyer A (2021) Effect of *EPSPS* gene copy number and glyphosate selection on fitness of glyphosate-resistant *Bassia scoparia* in the field. Sci. Rep. doi:10.1038/s41598-021-95517-2
8. **Kumar V**, *Liu R, Currie RS, Jha P, Morran S, Gaines TA, Stahlman PW (2020) Cross-resistance to atrazine and metribuzin in multiple herbicide-resistant kochia accessions: confirmation, mechanism, and management. Weed Technol. doi: 10.1017/wet.2020.141
9. *Meyeres TP, Lancaster S, **Kumar V**, Roozeboom K, Peterson DE (2020) Response of non-dicamba-resistant soybean (*Glycine max*) varieties to dicamba. Weed Technol. doi: 10.1017/wet.2021.4
10. Aulakh JS, Chahal PS, **Kumar V,** Price AJ, Guillard K (2020) Multiple herbicide-resistant Palmer amaranth (*Amaranthus palmeri*) in Connecticut: Confirmation and response to post herbicides. Weed Technol. doi: 10.1017/wet.2021.6
11. **Kumar V,** *Liu R, Peterson DE, Stahlman PW (2020) Effective two-pass herbicide programs to control glyphosate-resistant Palmer Amaranth (*Amaranthus palmeri*) in glyphosate/dicamba-resistant soybean. Weed Technol. doi:10.1017/wet.2020.90.
12. De Sanctis JHS, Barnes ER, Knezevic SZ, **Kumar V**, Jhala AJ (2020) Residual herbicides affect critical time of Palmer amaranth (*Amaranthus palmeri*) removal in dicamba/glyphosate-resistant soybean. Agron. J. doi: 10.1002/agj2.20615
13. De Sanctis JHS, Knezevic SZ, **Kumar V**, Jhala AJ (2020) Effect of single or sequential POST herbicide applications on seed production and viability of glyphosate-resistant Palmer amaranth (*Amaranthus palmeri*) in dicamba/glyphosate-resistant soybean. Weed Technol. doi:10.1017/wet.2021.7

14. **Kumar V,** *Liu R, Manuchehri MR, Westra E, Gaines TA, Shelton C (2020) Feral Rye control in quizalofop-resistant winter wheat in central Great Plains. Agron. J. doi:10.1002/agj2.20484
15. **Kumar V,** Obour A, Jha P, *Liu R, Manuchehri MR, Dille JA, Holman J, Stahlman PW (2020) Integrating cover crops for weed management in the semi-arid U.S. Great Plains: Opportunities and Challenges. Weed Sci. doi: 10.1017/wsc.2020.29
16. Yadav R, **Kumar V**, Jha P (2020) Herbicide programs to manage glyphosate-resistant and dicamba-resistant kochia *(Bassia scoparia*) in glyphosate plus dicamba-resistant soybean. Weed Technol. doi: 10.1017/wet.2020.3
17. **Kumar V,** *Liu R, Stahlman PW (2020) Differential sensitivity of Kansas Palmer amaranth to glyphosate, chlorsulfuron, 2,4-d, dicamba, atrazine, and mesotrione. Agron. J. doi:10.1002/agj2.20178 (*Research results from this study were featured in the CSA News magazine of ASA, CSSA, and SSSA. Volume 65, Issue 5, page 14)*
18. Lyon DJ, Thorne ME, Jha P, **Kumar V**, Waters TM (2019) Volunteer buckwheat control in wheat. Crop, Forage, Turf Manage. doi:10.2134/cftm2019.05.0033
19. **Kumar V**, *Liu R, *Boyer G, Stahlman PW (2019) Confirmation of 2,4-D resistance and identification of multiple resistance in a Kansas Palmer amaranth (*Amaranthus palmeri*) population. Pest Manag. Sci. doi:10.1002/ps.5400
20. **Kumar V**, Currie RS, Jha P, Stahlman PW (2019) First report of Kochia (*Bassia scoparia*) with cross-resistance to dicamba and fluroxypyr in western Kansas. Weed Technol. doi:10.1017/wet.2018.113
21. Mikha M, Obour A, **Kumar V**, Stahlman PW (2018) Soil physicochemical properties influenced by nitrogen sources and rates in the central Great Plains. J. Soil Water Conserv. doi:10.2489/jswc.74.6.584.
22. **Kumar V**, *Engel RP, Currie RS, Jha P, Stahlman PW, Thompson C (2018) Dicamba-resistant kochia (*Bassia scoparia*) in Kansas: Characterization and management with fall- or spring-applied preemergence herbicides. Weed Technol. doi:10.1017/wet.2019.4 *(Selected as a featured article in Weed Technology journal Vol 33, Issue 2; results from this study were highlighted through an online blog on WSSA website and kochia picture from this study was published on the cover page of this issue)*
23. **Kumar V**, Jha P, Jugulam M, Yadav R, Stahlman PW (2018) Herbicide-resistant kochia (*Bassia scoparia*) in North America: A review. Weed Sci. doi:10.1017/wsc.2018.72 *(Selected as a featured article in Weed Science journal Vol 67, Issue 1; results from this study were highlighted through an online blog on WSSA website and kochia picture from this study was published on the cover page of this issue)*
24. **Kumar V**, Jha P, Lim CA, Stahlman PW (2018) Differential germination characteristics of dicamba-resistant kochia (*Bassia scoparia*) populations in response to temperature. Weed Sci. doi:10.1017/wsc.2018.54

25. Shaw J, Jha P, Nugent P, Donelick A, Scherrer B, **Kumar V** (2017) Discrimination of herbicide-resistant weeds with hyperspectral imaging. J Appl. Remote Sens. doi:10.1117/1.JRS.12.016037
26. Ganie ZA, Kaur S, Jha P, **Kumar V**, Jhala AJ (2017) Effect of late-season herbicide applications on inflorescence and seed production of glyphosate-resistant giant ragweed (*Ambrosia trifida* L.). Weed Technol. doi:10.1017/wet.2017.101
27. Jha P, **Kumar V**, Lim CA, Yadav R (2017) Evaluation of preemergence herbicides for crop safety and weed control in safflower. Am. J. Plant Sci. doi: 10.4236/ajps.2017.810158
28. **Kumar V**, Jha P, Jhala AJ (2017) Using pyroxasulfone for downy brome (*Bromus tectorum* L.) control in winter wheat. Am. J. Plant Sci. doi:10.4236/ajps.2017.810159
29. **Kumar V,** Felix J, Morishita D, Jha P (2017) Confirmation of glyphosate-resistant kochia (*Kochia scoparia* L.) from sugar beet fields in Idaho and Oregon. Weed Technol. doi:10.1017/wet.2017.80
30. **Kumar V,** Jha P, Dille JA, Stahlman PW (2017) Emergence dynamics of kochia (*Kochia scoparia*) populations from the US Great Plains: A multi-site-year study. Weed Sci. doi: 10.1017/wsc.2017.55
31. **Kumar V,** Jha P (2017) First report of $Ser_{653}Asn$ mutation endowing high-level resistance to imazamox in downy brome (*Bromus tectorum* L.). Pest Manag. Sci. doi: 10.1002/ps.4673
32. Jha P, **Kumar V** (2017) Pulse crop tolerance and weed control with fall-applied soil-residual herbicides. Agron. J. doi:10.2134/agronj2017.06.0320
33. **Kumar V,** Jha P, Jhala A (2017) Confirmation of glyphosate-resistant horseweed (*Conyza canadensis* L.) in Montana cereal production and response to postemergence herbicides. Weed Technol. doi:10.1017/wet.2017.49
34. **Kumar V**, Jha P, Spring JF, Lyon DJ, Burke IC (2017) Glyphosate-resistant Russian thistle (*Salsola tragus* L.) identified in Montana and Washington. Weed Technol. doi:10.1017/wet.2016.32
35. **Kumar V**, Jha P (2017) Effect of temperature on germination characteristics of glyphosate-resistant and -susceptible *Kochia scoparia*. Weed Sci. doi:10.1017/wsc.2016.26
36. Gaines TA, Barker AL, Patterson EL, Westra P, Westra EP, Wilson RG, Jha P, **Kumar V**, Kniss AR (2016) EPSPS gene copy number and whole-plant glyphosate resistance level in *Kochia scoparia.* PLoS One doi:10.1371/journal.pone.0168295
37. **Kumar V**, Jha P (2016) Differences in germination, growth, and fecundity characteristics of dicamba-fluroxypyr-resistant and -susceptible *Kochia scoparia*. PLoS One doi: 10.1371/journal.pone.0161533
38. **Kumar V**, Jha P (2016) Influence of nitrogen rate, seeding rate, and weed removal timing on weed interference in barley and effect of nitrogen on weed response to herbicides. Weed Sci. doi:10.1614/WS-D-16-00047.1

39. Jha P, **Kumar V**, Godara RK, Chauhan BS (2016) Weed management using crop competition in the United States. Crop Prot. doi:10.1016/j.cropro.2016.06.021
40. Jha P, **Kumar V**, Lim CA (2016) Herbicide resistance in cereal production systems of US Great Plains: A review. Indian J. Weed Sci. 48 (2):1–5. doi:10.5958/0974-8164.2016.00030.7
41. Udeigwe TK, Teboh JM, Eze PN, Stietiya MH, **Kumar V,** Hendrix J, Mascagni HJ (Jr), Ying T, Kandakji T (2015) Implications of leading crop production practices on environmental quality and human health. J Env. Manag.151: 267–279. doi:10.1016/j.jenvman.2014.11.024
42. Jha P, **Kumar V** (2015) Variable response of kochia [*Kochia scoparia* (L.) Schrad] to auxinic herbicides dicamba and fluroxypyr in Montana. Can. J. Plant Sci. 95 (5): 965–972. doi:10.4141/CJPS-2015-019
43. Jha P, Norsworthy JK, **Kumar V,** Reichard N (2015) Annual changes in temperature and light requirements for *Ipomoea purpurea* seed germination with after-ripening in the field following dispersal. Crop Prot. 67:84–90. doi:10.1016/j.cropro.2014.09.021
44. Jha P, **Kumar V,** Garcia J, Reichard N (2015) Tank-mixing pendimethalin with pyroxasulfone and chloroacetamide herbicides enhances in-season residual weed control in corn. Weed Technol. 29:198–206. doi:10.1614/WT-D-14-00095.1
45. **Kumar V,** Jha P (2015) Growth and reproduction of glyphosate-resistant and susceptible populations of *Bassia scoparia*. PLoS One 10(11): e0142675. doi:10.1371/journal.pone.0142675
46. **Kumar V,** Udeigwe TK, Clawson E, Rohli R, Miller D (2015) Crop water use and stage-specific crop coefficients for irrigated cotton in mid-South United States. Agri. Water Manag. 15:63–69. doi:10.1016/j.agwat.2015.03.022
47. **Kumar V**, Jha P (2015) Influence of glyphosate timing on *Kochia scoparia* demographics in glyphosate-resistant sugar beet. Crop Prot.76:39–45. doi:10.1016/j.cropro.2015.06.010
48. **Kumar V,** Jha P (2015) Control of volunteer glyphosate-resistant canola in glyphosate-resistant sugar beet. Weed Technol. 29:93-100. doi:10.1614/WT-D-14-00059.1
49. **Kumar V**, Jha P (2015) Influence of herbicides applied postharvest in wheat stubble on control, fecundity, and progeny fitness of *Bassia scoparia*. Crop Prot. 71:144–149. doi:10.1016/j.cropro.2015.02.016
50. **Kumar V,** Jha P (2015) Effective preemergence and postemergence herbicide programs for kochia control. Weed Technol. 29: 24–34. doi:10.1614/WT-D-14-00026.1
51. **Kumar V**, Jha P, Giacomini D, Westra E, Westra E (2015) Molecular basis of evolved resistance to glyphosate and acetolactate synthase-inhibitor herbicides in kochia (*Kochia scoparia*) accessions from Montana. Weed Sci. 63: 758–769. Doi:10.1614/WS-D-15-00021.1
52. **Kumar V,** Jha P, Reichard N (2014) Occurrence and characterization of kochia (*Kochia scoparia*) accessions with resistance to glyphosate in Montana. Weed Technol. 28:122–

130. doi:10.1614/WT-D-13-00115.1 *(A photograph from this study was selected by the editorial board and it was published on a cover page of Weed Technology volume 29, issue 1, 2015)*

## *Herbicide-Resistant Weed Biotypes Reported:5*

1. First report of shattercane populations with resistance to imazamox in western Kansas (**First Confirmed Case from Kansas**). Reported in fall 2020 from sorghum fields in northwest Kansas. Available at http://weedscience.org/Pages/Case.aspx?ResistID=500
2. First report of kochia populations with cross-resistance to dicamba and fluroxypyr in western Kansas (**First Confirmed Case from Kansas**). Reported in fall 2018 from corn research plots near Garden City, KS. Available at http://weedscience.com/Details/Case.aspx? ResistID=10973.
3. Confirmation of 2,4-D resistance and identification of multiple resistance to glyphosate, chlorsulfuron, atrazine, and mesotrione in a Kansas Palmer amaranth population (**First Confirmed Global Case**). Reported in spring 2019 from a sorghum field in Barton County, KS. Available at http://weedscience.com/Details/Case.aspx?ResistID=18157.
4. Occurrence of a *downy brome* population with cross-resistance to ALS inhibitors. (**First Confirmed Case from Montana**). Reported in fall 2016 from Clearfield® wheat field in Carter County, MT. Available at http://weedscience.com/Details/Case.aspx?ResistID=15071.
5. Confirmation of glyphosate-resistant *Russian-thistle* biotype in Montana. (**First Confirmed Global Case).** Reported in fall 2015 from chemical-fallow field in Choteau County, MT. Available at http://weedscience.com/Details/Case.aspx?ResistID=12032.

## *Extension Publications: 34*

Chemical Weed Control Guides (4)

1. Lancaster SR, Fick WH, Currie RS, **Kumar V** (2021) Chemical weed control for field crops, pastures, rangeland, and noncropland. Report of Progress 1162. Kansas State University, January 2021. Contribution no. 21-106-S from the Kansas Agricultural Experiment Station. https://www.bookstore.ksre.ksu.edu/pubs/SRP1162.pdf
2. Lancaster SR, Peterson DE, Fick WH, Currie RS, **Kumar V**, Slocomb JW (2020) Chemical weed control for field crops, pastures, rangeland, and noncropland. Report of Progress 1155. Contribution no. 20-103-S from the Kansas Agricultural Experiment Station. https://www.bookstore.ksre.ksu.edu/pubs/SRP1155.pdf
3. Peterson DE, Fick WH, Currie RS, **Kumar V**, Slocomb JW (2019) Chemical weed control for field crops, pastures, rangeland, and noncropland. Report of Progress 1148. Kansas State University, January 2019. Contribution no. 19-100-S from the Kansas Agricultural Experiment Station. https://bookstore.ksre.ksu.edu/pubs/SRP1148.pdf
4. Thompson CR, Peterson DE, Fick WH, Currie RS, **Kumar V**, Slocomb JW (2018) Chemical weed control for field crops, pastures, rangeland, and noncropland. Report of

Progress 1139. Kansas State University, January 2018. Contribution no. 18-215-S from the Kansas Agricultural Experiment Station. https://bookstore.ksre.ksu.edu/pubs/SRP1139.pdf

Field Research Reports/Extension Bulletins (21)

1. **Kumar V**, Schmale D, Anderson R, Klein B (2021) Jointed goatgrass: Best management practices central Great Plains. Washington State University Extension. EB2033E. https://pubs.extension.wsu.edu/jointed-goatgrass-best-management-practices-bmp-central-great-plains
2. **Kumar V**, Manuchehri M, Schmale D, Peeper T, Stahlman P (2021) Jointed goatgrass: Best management practices southern Great Plains. Washington State University. EM011E. https://research.libraries.wsu.edu/xmlui/handle/2376/18764
3. **Kumar V,** *Effertz I, *Lambert T, *Liu R, Bean B (2021) Efficacy of Imiflex, Zest, and Assure II on green foxtail control. Field Research Report. Kansas Agricultural Experiment Station Research Reports: Vol. 7: Iss. 5. https://doi.org/10.4148/2378-5977.8087
4. **Kumar V**, *Lambert T, *Liu R, Currie RS, Stahlman PW (2021) Auxinic herbicide mixtures for controlling multiple herbicide-resistant kochia in fallow. Field Research Report. Kansas Agricultural Experiment Station Research Reports: Vol. 7: Iss. 5. https://doi.org/10.4148/2378-5977.8088
5. *Liu R, *Effertz I, *Lambert T, Jhala A, **Kumar V** (2021) Interaction of 2,4-D with glyphosate or graminicides on grass weed control in Enlist E3 soybeans. Field Research Report. Kansas Agricultural Experiment Station Research Reports: Vol. 7: Iss. 5. https://doi.org/10.4148/2378-5977.8089
6. *Liu R, *Effertz I, *Lambert T, Jhala A, **Kumar V** (2021) Effect of tank-mixing glyphosate, dicamba, and graminicides on grass weed control in Roundup Ready 2 Xtend soybeans. Field Research Report. Kansas Agricultural Experiment Station Research Reports: Vol. 7: Iss. 5. https://doi.org/10.4148/2378-5977.8090
7. *Liu R, *Effertz I, *Lambert T, **Kumar V** (2021) Control of volunteer Enlist corn in Enlist E3 soybean. Field Research Report. Kansas Agricultural Experiment Station Research Reports: Vol. 7: Iss. 5. https://doi.org/10.4148/2378-5977.8091
8. **Kumar V,** *Liu R, *Lambert T (2020) Response of Kansas feral rye populations to aggressor herbicide and management in CoAXium wheat production system. Field Research Report. Kansas Agricultural Experiment Station Research Reports: Vol. 6: Iss. 5. https://doi.org/10.4148/2378-5977.7939
9. *Liu R, **Kumar V**, *Aquilina N, *Lambert T (2020) Efficacy of late-season herbicide programs for controlling Palmer amaranth in postharvest wheat stubble. Field Research Report. Kansas Agricultural Experiment Station Research Reports: Vol. 6: Iss. 5. https://doi.org/10.4148/2378-5977.7936

10. *Liu R, **Kumar V**, *Lambert T (2020) Control of multiple herbicide-resistant Palmer amaranth in Enlist corn. Field Research Report. Kansas Agricultural Experiment Station Research Reports: Vol. 6: Iss. 5. https://doi.org/10.4148/2378-5977.7938
11. *Liu R, **Kumar V**, Currie RS, *Lambert T, Stahlman PW (2020) Response of dicamba/fluroxypyr/glyphosate-resistant kochia to atrazine and alternative postemergence herbicides. Field Research Report. Kansas Agricultural Experiment Station Research Reports: Vol. 6: Iss. 5. https://doi.org/10.4148/2378-5977.7939
12. **Kumar V**, Lawrence N, *Aquilina NK, Jones JF, Creech C, Spring J (2020) Effectiveness of PRE herbicides followed by Zidua POST for controlling glyphosate-resistant weeds in High Plains sunflower production. National Sunflower Association Forum Proceedings. **https://www.sunflowernsa.com/uploads/research/1357/SunflowerPaper_NSAForum_Kumar.pdf**
13. **Kumar V,** *Liu R, *Lambert T, Stahlman PW (2019) Herbicide strategies for managing glyphosate- and dicamba-resistant kochia in Roundup Ready 2 Xtend soybean. Field Research Report. Kansas Agricultural Experiment Station Research Reports: Vol. 5: Iss. 6. https://newprairiepress.org/kaesrr/vol5/iss6/19/
14. **Kumar V,** *Liu R, *Lambert T, Peterson DE, Minihan C, Stahlman PW (2019) Effective herbicide options for controlling glyphosate-resistant Palmer amaranth in Roundup Ready 2 Xtend soybean. Field Research Report. Kansas Agricultural Experiment Station Research Reports: Vol. 5: Iss. 6. https://newprairiepress.org/kaesrr/vol5/iss6/20 /
15. **Kumar V,** *Liu R, *Lambert T (2019) Characterization and management of glyphosate- and HPPD-inhibitor-resistant Palmer amaranth in Kansas corn production. Kansas Agricultural Experiment Station Research Reports: Vol. 5: Iss. 6. https://newprairiepress.org/kaesrr/vol5/iss6/21/
16. *Liu R, **Kumar V,** Perumal R, *Lambert T, Ostmeyer T (2019) Influence of cultural practices and herbicide programs for managing glyphosate-resistant Palmer amaranth in cold-tolerant sorghum. Kansas Agricultural Experiment Station Research Reports: Vol. 5: Iss. 6. https://newprairiepress.org/kaesrr/vol5/iss6/22/
17. Obour AK, Holman JD, Dille JA, **Kumar V** (2019) Effects of spring-planted cover crops on weed suppression and winter wheat grain yield in western Kansas. Kansas Agricultural Experiment Station Research Reports: Vol. 5: Iss. 6. https://newprairiepress.org/kaesrr/vol5/iss6/12/
18. **Kumar V,** Stahlman PW, *Boyer G (2018) Palmer amaranth populations from Kansas with multiple resistance to glyphosate, chlorsulfuron, mesotrione, and atrazine. *Kansas Agricultural Experiment Station Research Reports*: Vol. 4: Iss. 7. https://doi.org/10.4148/2378-5977.7611
19. **Kumar, V,** Stahlman PW, Currie RS, *Engel RS, *Boyer G (2018) Variable response of kochia accessions to dicamba and fluroxypyr in western Kansas. *Kansas Agricultural*

*Experiment Station Research Reports*: Vol. 4: Iss. 7. https://doi.org/10.4148/2378-5977.7612

20. Jha P, McVay K, Varanasi A, **Kumar** V (2013) Glyphosate-resistant kochia in Montana: Herbicide recommendations and best management practices for growers. 4602. Montana State University Extension Research Bulletin. http://store.msuextension.org/publications/AgandNaturalResources/4602.pdf
21. Jha P, **Kumar V** (2013) Effect of fertilizer N on crop-weed interactions in Montana cereal production. 64. Montana State University Extension Agricultural Experiment Station. Available at http://www.sarc.montana.edu/php/Research/ffacts/?id=64

E-Updates (11)

1. **Kumar V**, Bean B (2021) Imazamox-resistant shattercane populations identified from sorghum fields in northwest Kansas (eUpdate: April 22, 2021) https://bit.ly/2QsXaaW
2. Lancaster SR, **Kumar V** (2021) Late winter kochia control in fields going to soybeans, sunflowers, and wheat (eUpdate: Feb 18, 2021) https://eupdate.agronomy.ksu.edu/article_new/late-winter-kochia-control-in-fields-going-to-soybeans-sunflowers-and-wheat-428-4
3. Lancaster SR, **Kumar V** (2021) Late winter kochia control in fields going to corn or grain sorghum (eUpdate: Feb 11, 2021) https://eupdate.agronomy.ksu.edu/article_new/late-winter-kochia-control-in-fields-going-to-corn-or-grain-sorghum-426-1
4. Lancaster SR, **Kumar V** (2021) Pre-plant herbicide applications for kochia control (eUpdate: Feb 4, 2021) https://eupdate.agronomy.ksu.edu/article_new/pre-plant-herbicide-applications-for-kochia-control-425-4
5. **Kumar V,** Bean B (2020) In-season Palmer amaranth control in grain sorghum (eUpdate: July 24, 2020) https://webapp.agron.ksu.edu/agr_social/article_new/in-season-palmer-amaranth-control-in-grain-sorghum-399-3
6. **Kumar V**, Liu R (2020) New study evaluated different herbicide programs for Palmer amaranth control in postharvest wheat stubble (eUpdate: June 26, 2020) https://webapp.agron.ksu.edu/agr_social/article_new/new-study-evaluated-different-herbicide-programs-for-palmer-amaranth-control-in-post-harvest-wheat-stubble-395-3
7. **Kumar V** (2020) Kansas weed survey: Producers/ag professional input requested (eUpdate: June 12) https://webapp.agron.ksu.edu/agr_social/article_new/kansas-weed-survey-producers-ag-professionals-input-requested-393-9
8. Lancaster S, Dille A, **Kumar V** (2020) World of Weeds: Kochia (eUpdate: Jan 17) https://webapp.agron.ksu.edu/agr_social/article_new/world-of-weeds-kochia-369-1
9. **Kumar V,** Liu R, Peterson DE (2019) Management of feral rye with CoAXium wheat production system in Kansas (eUpdate: Oct 11, 2019) https://webapp.agron.ksu.edu/agr_social/article_new/management-of-feral-rye-with-coaxium-wheat-production-system-in-kansas-357
10. **Kumar V,** Currie RS, Stahlman PW (2018) Kochia accessions with cross-resistance to dicamba and fluroxypyr identified in western Kansas (eUpdate: Oct 5, 2018) https://webapp.agron.ksu.edu/agr_social/article_new/kochia-accessions-with-cross-resistance-to-dicamba-and-fluroxypyr-identified-in-western-kansas-301

11. Peterson DE, **Kumar V** (2018) CoAXium wheat and aggressor herbicide for grass weed control (eUpdate: Nov 9, 2018) https://webapp.agron.ksu.edu/agr_social/article_new/coaxium-wheat-and-aggressor-herbicide-for-grass-weed-control-307

## *Outreach Activities:*

Presentations to Growers groups/Ag Professionals in Kansas and region

1. Delivered 6 presentations and facilitated eight field tours at annual fall field days at Kansas State University, Agricultural Research Center near Hays, KS and Southwest Research and Extension Center near Garden City, KS in 2018, 2019 and 2020
2. **Kumar V.** Online Kansas weed survey: Producers/ag professionals input requested in July 2020 (~ 75 participants)
3. **Kumar V.** Weed research update to county agents in *Northwest and Southwest Area Agronomy Update* meetings at Hays and Garden City, KS in Dec 2017, 2018, 2019
4. **Kumar V**. Herbicide-resistant weed management research update in western Kansas. *Weed Schools* across 10 locations in western Kansas in Feb 2019, 2020 & 2021 (~ 300 attendees per year)
5. **Kumar V**. Managing herbicide-resistant weeds in western Kansas. *Cover Your Acres Conference* for no-till producers from KS, NE and CO in Oberlin, KS in Jan 2019 and 2021 (~ 500 attendees per year)
6. **Kumar V**. Herbicide-resistant kochia in southcentral Great Plains: Current options and path forward. *Winter Crops School by Oklahoma State University* at Stillwater, OK on Dec 18, 2019 (~210 attendees)
7. **Kumar V.** An update on weed control in wheat: Clearfield and CoAXium wheat technologies. *Crop Production Update by Kansas Agribusiness Retailers Association* at Salina, KS on Dec 5, 2019 (~75 attendees)
8. **Kumar V.** Research update on weed management in western Kansas. *Crop Pest Management Schools* in Beloit and Goodland, KS in Nov 2019 and Nov 2020 (~ 250 total attendees per year)
9. **Kumar V.** Current status and management of herbicide-resistant horseweed in Montana. *2019 Dealers and CCA Training* at Montana State University Southern Agricultural Research Center in Huntley, MT on Aug 8, 2019 (zoom talk, ~45 attendees)
10. Organized **a weed management field day** in Hays on July 2, 2019 (~75 attendees)
11. Kumar V. Herbicide-resistant Palmer amaranth management in western Kansas cropping systems. Cover Your Acres Conference in Oberlin, KS on Jan 15, 2019 (~250 attendees) and via zoom on Jan 19, 2021 (~220 viewers on zoom and 70 viewers on YouTube)
12. **Kumar V.** Biology and management of herbicide-resistant kochia in the U. S. Great Plains. *Nebraska Independent Crop Consultant Association (NICCA)* meeting at Kearney, NE on Dec. 03, 2018 (~85 attendees)

Media Appearance/Press Releases

1. New York Times Magazine highlighted Hays weed research program in a news story titled "Attack of the Superweeds" https://www.nytimes.com/2021/08/18/magazine/superweeds-monsanto.html?smid=tw-share

2. Fifteen radio interviews for KSU Ag Today, KAYS 94.3, KFRM, and High Plains Public Radio on various topics related to HR weeds and their management in 4 years
3. Press release titled "K-State researchers report shattercane resistance in grain sorghum" in K-State Research and Extension News: May 3, 2021
4. News article titled "Kansas Research: Palmer in Sunflower" published in "Sunflower Magazine" in Feb 2020
5. Press release titled "K-State researchers confirm case of 2,4-D resistance in Palmer amaranth" in K-State Research and Extension News: March 8, 2019
6. Interviewed with Dan Donnert (videographer with College of Ag) for weed projects
7. Provided expert opinion to *GMO Answers* community https://gmoanswers.com/ask/are-there-any-instances-where-superweeds-have-grown-or-developed-because-gmo-crops
8. DTN/The Progressive Farmers: "Kochia resistant to dicamba and fluroxypyr found in Kansas". https://www.dtnpf.com/agriculture/web/ag/news/crops/article/2018/10/11/kochia-resistant-dicamba-fluroxypyr
9. DTN/The Progressive Farmers: "The State of the Pigweed - 2, Palmer Amaranth's American Roadtrip: The New Frontier States. https://www.dtnpf.com/agriculture/web/Ag/crops/article/2019/01/29/palmer-amaranths-american-roadtrip-3

On-Farm Field Research Demonstrations

Collaborated with 3 growers near Great Bend, KS for field studies on managing HR weeds in corn, soybeans, and wheat

## *Non-Refereed Publications:*

**Conference Proceedings: 129** (58 oral presentations, 71 poster presentations)
These include proceedings/abstracts from international, national, and regional weed science meetings.

Oral Presentations (58)

*At K-state (2017-present)*

1. **Kumar V,** Stahlman PW (2021) Role of herbicide-resistant crops for controlling herbicide-resistant weeds in the Great Plains. Proc. West. Soc. Weed Sci. Abst., Mar 1–4, Virtual Meeting.
2. **Kumar V**, *Lambert T, Stahlman PW, Currie RS, Bruss B (2021) Control of multiple herbicide-resistant kochia in fallow. Proc. West. Soc. Weed Sci. Abst., Mar 1–4, Virtual Meeting.
3. Liu R, **Kumar V**, *Lambert T, Manuchehri MR, Bagavathiannan MV, Currie RS, Stahlman PS (2021) Distribution of herbicide-resistant kochia in southcentral Great Plains. Proc. West. Soc. Weed Sci. Abst., Mar 1–4, Virtual Meeting.
4. **Kumar V**, *Effertz IN, *Lambert T, *Liu R, Bean B (2021) Evaluation of herbicide-resistant grain sorghum technologies for grass weed control in High Plains. Proc. Weed Sci. Soc. Am. Abst., Feb 21–24, Virtual Meeting.

5. **Kumar V,** *Liu R, *Lambert T, Currie RS, Stahlman PW (2020) An update on herbicide-resistant kochia and palmer amaranth in western Kansas. Proc. of Weed Sci. Soc. of Am./West. Soc. Weed Sci. Abs., Mar 2– Mar 5, Maui, HI.
6. *Liu R, **Kumar V**, Currie RS, Geier P, *Lambert T, Stahlman PW (2020) Characterizing response of glyphosate-, dicamba-, and fluroxypyr-resistant kochia to atrazine and metribuzin. Proc. Weed Sci. Soc. Am./West. Soc. Weed Sci. Abs., Mar 2–5, Maui, HI.
7. Childers JT, Manuchehri MR, **Kumar V**, Oschner T, *Liu R, Lindell HC, Newlin LS (2020) Non-tolerant wheat response to quizalofop-p-ethyl in central Oklahoma. Proc. Weed Sci. Soc. Am./West. Soc. Weed Sci. Abs., Mar 2–5, Maui, HI.
8. Westra P, Howatt KA, Kruger GR, Dotray PA, Manuchehri MR, **Kumar V**, Bruss B (2020) Dichloprop-p combination with auxin herbicides for weed control in chemical fallow. Proc. Weed Sci. Soc. Am./West. Soc. Weed Sci. Abs., Mar 2–5, Maui, HI.
9. **Kumar V,** Lawrence N, *Aquilina NK, Jones JF, Creech C, Spring J (2020) Effectiveness of PRE herbicides followed by zidua POST for controlling glyphosate-resistant weeds in High Plains sunflower production. Nat. Sunfl. Assoc. Forum Proc. https://www.sunflowernsa.com/uploads/research/1357
10. **Kumar V,** *Liu R, *Lambert T, Stahlman PW (2020) Survey update on herbicide-resistant Palmer amaranth in Kansas. Proc. North Cent. Weed Sci. Soc. Abs., Nov 30-Dec 3, Virtual Meeting.
11. *Liu R, *Effertz IN, *Lambert T, **Kumar V** (2020) Control of volunteer Enlist E3® corn (*Zea mays*) in Enlist E3® soybean (*Glycine max*). Proc. North Cent. Weed Sci. Soc. Abs., Nov 30-Dec 3, Virtual Meeting.
12. *Effertz IN, **Kumar V**, Dille A, Obour A (2020) Cover crop termination interacts with residual herbicides for Palmer amaranth control in no-till soybean. Proc. North Cent. Weed Sci. Soc. Abs., Nov 30-Dec 3, Virtual Meeting.
13. **Kumar V**, *Liu R, *Aquilina NK, *Effertz IN, *Lambert T, Stahlman PW (2019) Herbicide-resistant Palmer amaranth in Kansas: Survey and management. Proc. North Cent. Weed Sci. Soc. Abs., Dec 10–13, Columbus, OH.
14. *Meyeres TP, Lancaster S, Peterson DE, **Kumar V** (2019) Response of non-dicamba-tolerant soybean varieties and traits to dicamba. Proc. North Cent. Weed Sci. Soc. Abs., Dec 10–13, Columbus, OH.
15. *Liu R, **Kumar V**, *Lambert T, Stahlman PW (2019) Response of a five-way-resistant Palmer amaranth population to preemergence applied mesotrione and atrazine. Proc. North Cent. Weed Sci. Soc. Abs., Dec 10–13, Columbus, OH.
16. Stahlman PW, **Kumar V** (2019) Herbicide resistant weeds threaten no-till systems: Lessons learned and management challenges. *Special Symposium-Generational Threats to no-till Systems: Glyphosate and Urea Dependence*. Am. Soc. Agron., Nov 10–13, San Antonio, TX.

17. Mikha MM, Obour A, **Kumar V**, Stahlman PW (2019) Management practices influenced soil chemical properties and grain yield of eroded cropland. Proc. Am. Soc. Agron. Abs., Nov 10–13, San Antonio, TX.
18. **Kumar V,** *Liu R, Currie RS, Jha P, *Lambert T (2019) Characterization and management of multiple herbicide-resistant kochia in western Kansas. Proc. West. Soc. Weed Sci. Abs., Mar 11–14, Denver, CO.
19. *Liu R, **Kumar V,** *Lambert T, Manuchehri MR (2019) Response of Kansas feral rye populations to imazamox and quizalofop-p-ethyl. Proc. West. Soc. Weed Sci. Abs., Mar 11–14, Denver, CO.
20. **Kumar V**, *Liu R, *Lambert T, Peterson DE (2019) Status of multiple herbicide-resistant Palmer amaranth in Kansas. Proc. Weed Sci. Soc. Am. Abs., Feb 11–14, New Orleans, LA.
21. *Liu R, **Kumar V**, Perumal R, *Lambert T (2019) Integrating cultural practices and herbicides for managing glyphosate-resistant Palmer amaranth in sorghum. Proc. Weed Sci. Soc. Am. Abs., Feb 11–14, New Orleans, LA.
22. Jha P, **Kumar V**, Lim CA, Yadav R, Leland S, Anjani J (2019) Herbicide resistance in Montana: Current status and future directions. Proc. Weed Sci. Soc. Am. Abs., Feb 11–14, New Orleans, LA.
23. Manuchehri MR, Crose JA, Baughman TA, Childers J, **Kumar V** (2019) Horseweed (*Conyza Canadensis* L.) management in Oklahoma winter wheat. Proc. Weed Sci. Soc. Am. Abs., Feb 11–14, New Orleans, LA.
24. **Kumar V,** *Liu R, Borgatto EA, Stahlman PW (2018) Management of glyphosate- and HPPD inhibitor resistant Palmer amaranth in corn. Proc. North Cent. Weed Sci. Soc. Abs., Dec 3–6, Milwaukee, WI.
25. Obour AK, Holman JD, Dille AJ, **Kumar V** (2018) Forage production and weed suppression potential of cover crops in semiarid central Great Plains. Proc. Am. Soc. Agron. Abs., Nov 4–7, Baltimore, MD.
26. **Kumar V,** Stahlman PW, *Boyer G (2018) Characterization of Palmer amaranth populations from Kansas with resistance to multiple herbicides. Proc. West. Soc. Weed Sci. Abs., Mar 12–15, Garden Grove, CA.
27. **Kumar V,** Jha P, Morishita DW, Yadav R, Anjani J, Lim CA (2018) Enhanced tolerance of common lambsquarters (*Chenopodium album*) to glyphosate in corn-sugar beet rotations in the western U.S. Proc. Weed Sci. Soc. Abs., Jan 29–Feb 1, Arlington, VA.
28. **Kumar V,** Stahlman PW, *Boyer G (2018) Investigation of multiple herbicide resistance in Palmer amaranth populations in Kansas. Proc. Weed Sci. Soc. Abs., Jan 29–Feb 1, Arlington, VA.
29. Lim CA, Jha P, Anjani J, **Kumar V** (2018) Reproductive Fitness of Glyphosate-Resistant and Dicamba-Resistant Kochia (*Kochia scoparia*) in the Presence or Absence of Glyphosate and Dicamba. Proc. Weed Sci. Soc. Abs., Jan 29–Feb 1, Arlington, VA (3, 4).

30. **Kumar V,** Jha P, Stahlman PW, Anjani J (2017) Confirmation and management of ALS-Resistant downy brome in wheat production systems of the U.S. Great Plains. Proc. North Cen. Weed Sci. Soc., Dec 4–7, Saint Louis, MO.

*At previous institutions (prior to 2017)*

31. Jha P, **Kumar V**, Kniss AR, Sbatella G, Lawrence N (2017) Herbicide-resistant kochia in the U. S. Great Plains: What we know and path forward. Global Herbicide Resistance Challenge, May 14–18, Denver, CO, USA.
32. **Kumar V,** Jha P, Spring JF, Anjani J, Lyon D, Burke IC (2017) Confirmation and management of glyphosate-resistant Russian thistle (*Salsola tragus* L.) from Montana and Washington. Proc. West. Soc. Weed Sci. 78. March 13–17, Coeur d'Alene, Idaho, USA.
33. Lim CA, Jha P, **Kumar V**, Leland S, Anjani J (2017) Survival, growth, and reproductive fitness of dicamba-resistant kochia in the presence of dicamba. Proc. West Weed Sci. 127. March 13–17, Coeur d'Alene, Idaho, USA.
34. **Kumar V,** Jha P, Anjani J., Leland S (2017) Confirmation and mechanism of resistance to imazamox in downy brome (*Bromus tectorum* L.) from Montana. Proc. West. Weed Sci. 164. March 13–17, Coeur d'Alene, Idaho, USA.
35. Jha P, Shaw J, **Kumar V,** Nugent P (2017) Hyperspectral imaging to detect herbicide-resistant weeds in-crop: Convergence of optical and ag technologies. Proc. West. Weed Sci. 166. March 13–17, Coeur d'Alene, Idaho, USA.
36. **Kumar V,** Jha P, Spring JF, Anjani J, Nandula VK, Reddy KN, Lyon D, Burke IC (2017) Characterization of glyphosate-resistant Russian thistle (*Salsola tragus* L.) populations in Montana and Pacific Northwest. Proc. Weed Sci. Soc. Am. 330. Feb. 6–9, Tucson, AZ, USA.
37. Jha P, **Kumar V,** Anjani J, Leland S (2017) Field-evolved resistance of downy brome (*Bromus tectorum* L.) to imazamox in cereal production. Proc. Weed Sci. Soc. Am. 327. Feb. 6–9, Tucson, AZ, USA.
38. **Kumar V,** Jha P, Lim CA, Anjani J, Leland S (2016) Biology and management of volunteer buckwheat in wheat. Proc. West. Soc. Weed Sci. 108. Mar 7–10, Albuquerque, New Mexico, USA.
39. **Kumar V,** Jha P, Lim CA, Anjani J, Leland S (2016) Correlation between dormancy and herbicide resistance levels in kochia. Proc. Weed Sci. Soc. Am. 372. Feb 8–11, San Juan, Puerto Rico, USA.
40. Jha P, Lim CA, **Kumar V**, Anjani J, Leland S (2016) Effect of glyphosate selection on survival and fecundity characteristics of glyphosate-resistant kochia with variable EPSPS gene copies. Proc. Weed Sci. Soc. Am. 376. Feb 8–11, San Juan, Puerto Rico, USA.
41. Jha P, **Kumar V,** Lim CA, Jha A (2015) Key herbicide-resistant weeds in the cereal production systems of US Great Plains. Proc. of *25th* Asian-Pacific Weed Sci. Soc. Conf.

on "Weed Science for Sustainable Agriculture, Environment and Biodiversity", Oct 13–16. Hyderabad, India.

42. **Kumar V**, Jha P, Leland S, Lim CA, Misra S (2015) Correlation of EPSPS gene amplification with resistance level and fitness of glyphosate-resistant kochia. Proc. Weed Sci. Soc. Am. 271. Feb 9–12, Lexington, KY, USA.
43. Jha P, Lim CA, **Kumar V**, Leland S (2015) Characterization of multiple herbicide resistance in kochia accessions from Montana. Proc. Weed Sci. Soc. Am. 271. Feb 9–12, Lexington, KY, USA.
44. Jha P, **Kumar V**, Leland S, Lim C (2015) Management of herbicide-resistant kochia in Montana. Proc. of Montana/Wyoming Sugar beet and Barley Symposium, Jan 6–7, Billings, MT.
45. **Kumar V,** Jha P, Westra P, Westra E, Giacomini D, Vanhorn C, Varanasi A (2014) Evolution of multiple herbicide-resistant kochia: a threat to Montana wheat-fallow cropping system. West. Soc. Crop Sci. meeting at Bozeman, MT, USA.
46. **Kumar V,** Jha P, Westra P, Westra E, Giacomini D, Vanhorn C (2014) EPSPS gene amplification confers glyphosate resistance in kochia populations from Montana. Proc. Weed Sci. Soc. Am. 381. Feb 3–6, Vancouver, CA.
47. **Kumar V,** Jha P, Varanasi A (2014) Ecological fitness of auxinic herbicide-resistant Kochia. Proc. West. Soc. Weed Sci. 80. Feb 3–6, Vancouver, CA.
48. Jha P, Varanasi A, **Kumar V**, Leland S (2014) Current status of herbicide-resistant kochia in Montana. Proc. West. Soc. Weed Sci. 89. Mar 10–13, Colorado Springs, CO, USA.
49. Varanasi A, Jha P, **Kumar V**, Leland S (2014) Comparative growth of kochia (*Kochia scoparia*) accessions from northern and central Great Plains. Proc. Weed. Sci. Soc. Am. 315. Feb 3–6, Vancouver, CA.
50. **Kumar V,** Jha P, Reichard N, KC JR (2013) Influence of glyphosate timing(s) on kochia cohorts in glyphosate-resistant sugar beet. Proc. Weed. Sci. Soc. Am. 326. Feb 4–7, Baltimore, MD, USA.
51. **Kumar V,** Jha P, Reichard N, KC JR (2013) Integrated herbicide programs for weed management in glyphosate-resistant sugar beet. Proc. West. Soc. Weed Sci. 101. Mar 11–14, San Deigo, CA, USA.
52. Jha P, **Kumar V,** Reichard N (2013) Kochia management without glyphosate in Montana. Proc. West. Soc. Weed Sci. 154. Mar 11–14, San Deigo, CA, USA.
53. Jha P, **Kumar V,** Reichard N (2013) Non-glyphosate herbicide programs for kochia management. Proc. Weed Sci. Soc. Am. 232. Feb 4–7, Baltimore, MD, USA.
54. **Kumar V,** Jha P, Reichard N (2012) Herbicide programs for kochia management revisited. Proc. West. Soc. Weed Sci. 65:121. Mar 12–15, Reno, NV, USA.
55. Jha P, **Kumar V,** Reichard N (2012) Volunteer glyphosate-resistant canola control in glyphosate-resistant sugar beet. Proc. Weed Sci. Soc. Am. 371. Feb 6–9, Waikoloa, HI, USA.

56. Jha P, **Kumar V,** Reichard N (2012) Herbicide programs for control of volunteer glyphosate-resistant canola in glyphosate-resistant sugar beet. Proc. West. Soc. Weed Sci. 65:122. Mar 12–15, Reno, NV, USA.
57. Udeigwe TK, **Kumar V** (2011) Local reference evapotranspiration estimation and the application to crop coefficient development in northeast Louisiana (Mid-South). ASA-CSSA-SSSA International Annual Meeting. Oct 16–19, Saint Antonio, Texas.
58. **Kumar V**, Clawson E, Udeigwe TK, Sheffield R, Chiu J, Hribal S (2010) Cotton crop coefficients ($K_c$) for northeast Louisiana using weighing lysimeters. Proc. Beltwide Cotton Conf. Jan 4–6, New Orleans, LA, USA.

Poster Presentations (71)

*At K-state (2017-present)*

1. Carnahan CC, Manuchehri MR, **Kumar V**, Carver BF, Lindell HC, Newlin LS, Childers JT (2021) CoAXium wheat variety tolerance to quizalofop in the southern Great Plains. Proc. West. Soc. Weed Sci. Abst., Mar 1–4, Virtual Meeting.
2. *Liu R, **Kumar V**, *Effertz IN, *Lambert T (2021) Evaluation of ALS- and ACCase-inhibiting herbicides for green foxtail control. Proc. West. Soc. Weed Sci. Abst., Mar 1–4, Virtual Meeting.
3. **Kumar V**, *Liu R, *Lambert T, Stahlman PW (2021) State of herbicide-resistant Palmer amaranth in Kansas. Proc. West. Soc. Weed Sci. Abst., Mar 1–4, Virtual Meeting.
4. *Effertz IN, **Kumar V**, Dille A, Obour A (2021) Influence of cover crop termination timing with soil residual herbicides on Palmer amaranth control in no-till soybean. Proc. Weed Sci. Soc. Am. Abst., Feb 21–24, Virtual Meeting.
5. **Kumar V**, *Liu R, *Lambert T, Stahlman PW (2021) Herbicide-resistant Palmer amaranth (*Amaranthus palmeri* S. Wats.) and Common Waterhemp (*Amaranthus tuberculatus*) in Kansas. Proc. Weed Sci. Soc. Am. Abst., Feb 21–24, Virtual Meeting.
6. **Kumar V**, *Liu R, *Aquilina NK, *Lambert T, Perumal R, Ostmeyer T, Tucker A (2020) Integration of cultural practices and herbicides for weed control in grain sorghum and soybean. Proc. Weed Sci. Soc. of Am./West. Soc. Weed Sci. Abst., Mar 2–5, Maui, HI.
7. *Liu R, **Kumar V**, *Aquilina NK, *Lambert T (2020) Effect of late-season applied herbicide tank mixtures on control and seed production of Palmer amaranth in postharvest wheat stubble. Proc. Weed Sci. Soc. Am./West. Soc. Weed Sci. Abs., Mar 2–5, Maui, HI.
8. **Kumar V**, *Effertz IN, *Lambert T, *Liu R (2020) Herbicide programs for weed control in isoxaflutole-resistant soybean. Proc. North Cent. Weed Sci. Soc. Abs., Nov 30-Dec 3, Virtual Meeting.
9. *Liu R, *Effertz IN, *Lambert T, Jhala A, Jha P, **Kumar V** (2020) Interaction of 2,4-D applied in combination with glyphosate or graminicides on grass weed control in Enlist E3® soybeans. Proc. North Cent. Weed Sci. Soc. Abs., Nov 30-Dec 3, Virtual Meeting.

10. *Liu R, *Effertz IN, *Lambert T, Jhala A, Jha P, **Kumar V** (2020) Interaction of dicamba applied in combination with glyphosate or graminicides on grass weed control in Roundup Ready 2 Xtend® soybeans. Proc. North Cent. Weed Sci. Soc. Abs., Nov 30-Dec 3, Virtual Meeting.
11. **Kumar V**, *Liu R, *Effertz IN, *Aquilina NK, *Lambert T, Stahlman PW (2019) Control of multiple herbicide-resistant Palmer amaranth. Proc. North Cen. Weed Sci. Soc. Abs., Dec 10-13, Columbus, OH.
12. *Aquilina NK, **Kumar V**, Tucker A, *Liu R, *Lambert T (2019) Integrated weed management in no-till dryland soybeans with row spacing, seeding rates and herbicides. Proc. North Cen. Weed Sci. Soc. Abs., Dec 10–13, Columbus OH.
13. *Effertz IN, **Kumar V**, Dille JA (2019) Effective herbicide programs for controlling 2,4-D-resistant Palmer amaranth in Enlist E3™ soybeans. Proc. North Cen. Weed Sci. Soc. Abs., Dec 10–13, Columbus, OH.
14. *Liu R, **Kumar V**, Stahlman PW (2019) Germination characteristics of 2,4-D-resistant and –susceptible Palmer amaranth under varying temperature conditions. Proc. North Cen. Weed Sci. Soc. Abs., Dec 10–13, Columbus, OH.
15. Gastler L, Dille JA, Duncan S, **Kumar V** (2019) Influence of grain sorghum planting dates and Palmer amaranth emergence timings on competitive outcomes. Proc. North Cen. Weed Sci. Soc. Abs., Dec 10–13, Columbus, OH.
16. Scarparo de Sanctis JH, Chahal PS, **Kumar V**, Knezevic SZ, Jhala AJ (2019) Effect of late season herbicide applications on seed production of glyphosate-resistant Palmer amaranth. Proc. North Cen. Weed Sci. Soc. Abs., Dec 10–13, Columbus, OH.
17. Scarparo de Sanctis JH, **Kumar V**, Knezevic SZ, Jhala AJ (2019) Glyphosate alternatives for cereal rye termination with different application timings in soybean. Proc. North Cen. Weed Sci. Soc. Abs., Dec 10–13, Columbus, OH.
18. Mikha MM, Obour A, **Kumar V**, Stahlman PW (2019) Management practices influenced soil chemical properties and grain yield of eroded cropland. Am. Soc. Agron., Nov 10-13, San Antonio, TX.
19. Childers JT, Manuchehri MR, **Kumar V**, *Liu R, Crose JA (2019) Non-tolerant wheat response to simulated drift of quizalofop-p-ethyl in central Oklahoma. Proc. West. Soc. Weed Sci. Abs., Mar 11–14, Denver, CO.
20. *Liu R, **Kumar V**, Lambert T, Jones JF (2019) Effective herbicide programs for managing glyphosate-resistant Palmer amaranth in Kansas sunflower production. Proc. West. Soc. Weed Sci. Abs., Mar 11–14, Denver, CO.
21. **Kumar V**, *Liu R, *Lambert T, Peterson DE, Stahlman PW (2019) An update on multiple herbicide-resistant Palmer amaranth in Kansas. Proc. West. Soc. Weed Sci. Abs., Mar 11–14, Denver, CO.
22. **Kumar V,** *Liu R, Manuchehri MR, Lawrence NC, Bagavathiannan MV, Gaines TA (2019) Emergence dynamics of Palmer amaranth populations from the Central Great Plains. Proc. West. Soc. Weed Sci. Abs., Mar 11–14, Denver, CO.

23. Jha P, Shaw JA, Scherrer BJ, **Kumar V**, Yadav R, Anjani J, Leland S (2019) Weed and crop discrimination with hyperspectral imaging and machine learning. Proc. West. Soc. Weed Sci. Abs., Mar 11–14, Denver, CO.
24. **Kumar V,** *Liu R, *Lambert T, Peterson DE (2019) Effective herbicide programs for managing glyphosate-resistant Palmer amaranth in Roundup Ready 2 Xtend soybean. Proc. Weed Sci. Soc. Am. Abs., Feb 11–14, New Orleans, LA.
25. *Liu R, **Kumar V**, *Lambert T, Manuchehri MR, Lawrence NC, Bagavathiannan MV, Gaines TA (2019) Emergence characteristics of Palmer amaranth populations from the U.S. Central Great Plains. Proc. Weed Sci. Soc. Am. Abs., Feb 11–14, New Orleans, LA.
26. Yadav R, Jha P, **Kumar V**, Leland S (2019) Response of dicamba-resistant Kochia to dicamba applied preemergence. Proc. Weed Sci. Soc. Am. Abs., Feb 11–14, New Orleans, LA.
27. Childers JT, Manuchehri MR, **Kumar V**, Crose JC, *Liu R (2019) Sensitivity of non-tolerant wheat to quizalofop-p-ethyl in central Oklahoma. Proc. South. Soc. Weed Sci. Abs., Feb 3–6, Oklahoma City, OK.
28. **Kumar V**, *Liu R, Jha P, Stahlman PW (2018) Herbicide programs for managing glyphosate- and dicamba-resistant kochia in Roundup Ready 2 Xtend soybeans. Proc. North Cen. Weed Sci. Soc. Abs., Dec 3–6, Milwaukee, WI.
29. *Meyeres TP, Peterson DE, **Kumar V** (2018) Soybean response to simulated dicamba drift with varying application rates and timings. Proc. North Cen. Weed Sci. Soc. Abs., Dec 3–6, Milwaukee, WI.
30. Scarparo de Sanctis JH, Knezevic S, **Kumar V**, Jhala A (2018) Critical period of Palmer amaranth removal affected by preemergence herbicides in dicamba-resistant soybean. Proc. North Cen. Weed Sci. Soc. Abs., Dec 3–6, Milwaukee, WI.
31. Obour AK, Holman JD, Dille AJ, **Kumar V** (2018) Forage production and weed suppression potential of cover crops in semiarid central Great Plains. Proc. Am. Soc. Agron., Nov 4–7, Baltimore, MD, USA.
32. **Kumar V,** Stahlman PW, Currie RS, Engel R, *Boyer G (2018) Variable response of Kochia populations to dicamba and fluroxypyr. Proc. West. Soc. Weed Sci. Abs., Mar 12–15, Garden Grove, CA.
33. Jha P, **Kumar V**, Morishita DW, Yadav R, Anjani J, Lim CA (2018) Variable tolerance of common lambsquarters to glyphosate in corn-Sugarbeet fields. Proc. West. Soc. Weed Sci. Abs., Mar 12–15, Garden Grove, CA.
34. Yadav R, Jha P, **Kumar V**, Leland S (2018) Management of glyphosate- and dicamba-resistant kochia (*Kochia scoparia*) in Roundup Ready® 2 Xtend soybean. Proc. West. Soc. Weed Sci. Abs., Mar 12–15, Garden Grove, CA.
35. **Kumar V,** Stahlman PW, Boyer G (2018) Investigation of multiple herbicide resistance in Palmer amaranth populations in Kansas. Proc. Weed Sci. Soc. Am., Jan 29–Feb 1, Arlington, VA.

36. *Engel RP, **Kumar V**, Stahlman PW, *Boyer G (2018) Variable response of Kansas *Kochia scoparia* accessions to dicamba. Proc. Weed Sci. Soc. Abs., Jan 29–Feb 1, Arlington, VA.
37. Jha P, **Kumar V**, Anjani J, Yadav R, Lim CA, Leland S (2018) Evolution of ALS-resistant downy brome in Montana cereal production. Proc. Weed Sci. Soc. Am. Abs., Jan 29–Feb 1, Arlington, VA.
38. Yadav R, Jha P, **Kumar V**, Leland S (2018) Management of glyphosate- and dicamba-resistant kochia (*Kochia scoparia*) in Roundup Ready® 2 Xtend soybean. Proc. Weed Sci. Soc. Am. Abs., Jan 29–Feb 1, Arlington, VA.
39. **Kumar V,** Jha P, Stahlman PW, Jugulam M, Currie RS, Dille JA, Peterson DE, Thompson CR, Shoup D (2017) An overview of herbicide-resistant weeds in Kansas. Proc. North Cen. Weed Sci. Soc. Abs., Dec 4–7, Saint Louis, MO.

*At previous institutions (prior to 2017)*

40. **Kumar V,** Jha P, Anjani J, Lim CA, Leland S (2017) Evolution and management of glyphosate-resistant weeds in wheat-fallow in Montana. Global Herbicide Resistance Challenge. May 14–18, Denver, CO, USA.
41. Jha P, **Kumar V**, Anjani J, Spring JF, Lyon DJ, Burke IC, Nandula VK, Reddy KN (2017) Evolution of glyphosate-resistant *Salsola tragus* L. (Russian thistle) in Montana and Pacific Northwest. Global Herbicide Resistance Challenge. May 14–18, Denver, CO, USA.
42. Jha P, **Kumar V**, Leland S, Anjani J, Lim CA (2017) Evolution of glyphosate-resistant horseweed and Russian thistle in Montana cereal production. Proc. West Soc. Weed Sci. 31. March 13–17, Coeur d'Alene, Idaho, USA
43. Lim CA, Jha P, **Kumar V**, Leland S, Anjani J (2017) Survival, growth, and fecundity of kochia cohorts with varying densities under different crop canopies. Proc. West Soc. Weed Sci. 47. March 13–17, Coeur d'Alene, Idaho, USA **(***1st position in student poster competition).*
44. **Kumar V,** Jha P, Anjani J, Lim CA, Leland S (2017) Confirmation and management of newly evolved glyphosate-resistant Russian thistle (*Salsola tragus* L.) and horseweed (*Conyza canadensis* L.) in Montana cereal production. Proc. Weed Sci. Soc. Am. 34. Feb. 6–9, Tucson, AZ, USA.
45. Jha P, **Kumar V,** Nugent P, Donelick A, Scherrer B, Shaw J (2017) Hyperspectral imaging to detect glyphosate-resistant vs. glyphosate-susceptible *Kochia scoparia*: Implications for site-specific management. Proc. Weed Sci. Soc. Am. 62. Feb. 6–9, Tucson, AZ, USA.
46. **Kumar V,** Jha P, Leland S, Anjani J, Lim CA (2016) Seed germination dynamics of herbicide-resistant and susceptible populations of *Kochia scoparia*. Proc. West Soc. Weed Sci. 64. Mar 7–10, Albuquerque, New Mexico, USA.

47. Lim CA, Jha P, **Kumar V,** Anjani J, Leland S (2016) Survival and fecundity of glyphosate-resistant kochia with variable EPSPS gene copies in response to glyphosate selection. Proc. West Soc. Weed Sci. 33. Mar 7–10, Albuquerque, New Mexico, USA.
48. Jha P, Felix J, Morishita D, **Kuma**r V, Anjani J (2016) Survey of glyphosate-resistant kochia in eastern Oregon sugar beet fields. Proc. West Soc. Weed Sci. 35. Mar 7–10, Albuquerque, New Mexico, USA.
49. **Kumar V,** Jha P, Lim CA, Anjani J, Leland S (2016) Distribution of multiple herbicide-resistant kochia in Montana. Proc. Weed Sci. Soc. Am. 204. Feb 8–11, San Juan, Puerto Rico, USA.
50. Jha P, **Kumar V** (2015). Best management practices (BMPs) for herbicide resistance management: A review. Proc. of *25th* Asian-Pacific Weed Sci. Soc. Conf. on "Weed Science for Sustainable Agriculture, Environment and Biodiversity", Oct 13–16. Hyderabad, India.
51. Morishita D, Felix J, Jha P, **Kumar V** (2015) Confirmation of glyphosate-resistant kochia in Idaho and Oregon. Proc. West. Soc. Weed Sci. 27. Mar 9–12, Portland, OR, USA.
52. Jha P, **Kumar V,** Leland S, Lim CA (2015) Variable response of kochia to dicamba and fluroxypyr in Montana. Proc. West. Soc. Weed Sci. 28. Mar 9–12, Portland, OR, USA.
53. Lim CA, Jha P, **Kumar V,** Leland S (2015) Survey of multiple herbicide-resistant kochia in Montana. Proc. West. Soc. Weed Sci. 31. Mar 9–12, Portland, OR, USA.
54. Lim CA, Jha P, **Kumar V,** Leland S (2015) Influence of pyroxasulfone rate and application timing on downy brome control in Clearfield winter wheat. Proc. West. Soc. Weed Sci. 40. Mar 9–12, Portland, OR, USA.
55. **Kumar V,** Jha P, Flenniken M, Misra S (2015) Does *EPSPS* gene amplification confer fitness cost in glyphosate-resistant kochia? Proc. Weed Sci. Soc. Am. 110. Mar 9–12, Portland, OR, USA.
56. Jha P, Morishita D, Felix J, **Kumar V**, Flenniken M (2015) Confirmation of glyphosate-resistant kochia in Idaho and Oregan. Proc. Weed Sci. Soc. Am. 104. Feb 9–12, Lexington, KY, USA.
57. Walsh O, Jha P, Varanasi A, **Kumar V**, Leland S (2014) Light-activated sensor controlled sprayer (weed seekers®) for cost-effective weed control in post-harvest wheat stubble. Proc. ASA-CSSA-SSSA International Annual Meeting, Nov 2–5, Long Beach, CA, USA.
58. **Kumar V,** Jha P, Westra P, Westra E, Giocomini D, Van Horn C, Varanasi A (2014) Molecular characterization of glyphosate- and acetolactate synthase inhibitor-resistant kochia from Montana. Proc. West. Soc. Weed Sci. 21. Mar 10–13, Colorado Springs, CO, USA (*1st position in student poster competition*)**.**
59. **Kumar V,** Jha P, Varanasi A, Leland S (2014) Kochia management with herbicides applied postharvest in wheat stubble. Proc. Weed Sci. Soc. Am. 23. Feb 3–6, Vancouver, CA.

60. Jha P, **Kumar V,** Varanasi A (2014) Use of pyroxasulfone for weed control in Clearfield® wheat system. Proc. West. Soc. Weed Sci. 34. Mar 10–13, Colorado Springs, CO, USA.
61. Jha P, Varanasi A, **Kumar V,** Leland S (2014) Light-activated sensor controlled sprayer (weed seeker®) for cost-effective weed control in post-harvest wheat-stubble. Proc. West. Soc. Weed Sci. 30. Mar 10–13, Colorado Springs, CO, USA.
62. Varanasi A, Jha P, **Kumar V**, Leland S (2014) Emergence Characterization of Kochia (*Kochia scoparia*) Accessions from Northern and Central Great Plains. Proc. Weed Sci. Soc. Am. 83. Feb 3–6, Vancouver, CA.
63. **Kumar V,** Jha P, Reichard N, KC JR (2013) Does fertilizer N influence crop-weed competition and response to herbicides? Proc. Weed Sci. Soc. Am. 28. Feb 4–7, Baltimore, MD, USA.
64. **Kumar V,** Jha P, Reichard N, KC JR (2013) Does fertilizer N influence crop-weed competition and weed response to herbicides? Proc. West. Soc. Weed Sci. 42. Mar 11–14, San Deigo, CA, USA.
65. Jha P, **Kumar V,** Reichard N (2013) Evaluation of preemergence residual herbicide programs for weed control in glyphosate-resistant corn. Proc. Weed Sci. Soc. Am. 5. Feb 4–7, Baltimore, MD, USA.
66. Jha P, **Kumar V,** Reichard N (2013) Preemergence residual herbicides: A valuable tool for weed control in glyphosate-resistant corn. Proc. West. Soc. Weed Sci. 33. Mar 11–14, San Deigo, CA, USA.
67. Reichard N, Jha P, **Kumar V** (2013) Evaluation of pyroxasulfone for crop safety and downy brome control in winter wheat. Proc. West. Soc. Weed Sci. 41. Mar 11–14, San Deigo, CA, USA.
68. KC JR, Jha P, **Kumar V**, Reichard N (2013) Herbicide programs for weed control in Clearfield® lentils. Proc. West. Soc. Weed Sci. 49. Mar 11–14, San Deigo, CA, USA.
69. **Kumar V,** Jha P, Reichard N (2012) Comparison of fluroxypyr herbicide combinations for broadleaf weed control in spring wheat. Proc. West Soc. Weed Sci. 65:55. Mar 12–15, Reno, NV, USA.
70. Jha P, **Kumar V,** Reichard N (2012) Zidua (pyroxasulfone): A new chemistry for preemergence residual weed control in glyphosate-resistant corn. Proc. Weed Sci. Soc Am. 4. Feb 6–9, Waikoloa, HI, USA.
71. Jha P, **Kumar V,** Reichard N (2012) Use of pyroxasulfone for preemergence residual weed control in glyphosate-resistant corn. Proc. West. Soc. Weed Sci. 65:61. Mar 12–15, Reno, NV, USA.

## III.B. GRANTS AND CONTRACTS:

Total grant secured **$4,297,985** as PI/Co-PI (**$1,348,828** directed to my program)

### 2021

*Funds Directed to the Program: **($330,045)***

- Integrating ecological tactics to manage herbicide-resistant pigweeds in major U.S. soybean production regions. *United States Department of Agriculture-National Institute of Food and Agriculture (USDA-NIFA).* **$90,000 (Co-PI: V. Kumar)** Total amount: $325,000 [PIs: P. Jha from Iowa State Univ., V. Kumar from Kansas State Univ., and J. Norsworthy from Univ. Arkansas]
- Integrating best management practices (BMPs) for herbicide-resistant weeds and herbicide stewardship in soybean production. *United Soybean Board.* **$24,000 (Co-PI: V. Kumar)** Total amount: $695,000 [PIs: B. Young, W.G. Johnson, et al. ….22 co-PIs from 17 Universities]
- Field-scale testing of weed identification and mapping tools for accelerating integrated weed management adoption (FY22). United Soybean Board. **$15,000 (Co-PI: V. Kumar)** Total amount: $249,675 [PIs: S. Mirsky, K. Gage, D. Sarangi, et al. …..17 co-PIs from 13 Universities]
- Biology and management of feral rye, downy brome and jointed goat grass in Kansas wheat production. *Kansas Wheat Commission, Kansas Wheat Alliance, Kansas Crop Improvement Association.* **19,145** [PI: **V. Kumar**]- year 3
- Integrating cover crops and residual herbicides to control glyphosate-resistant weeds in High Plains Sunflower Production. *National Sunflower Association*. **$16,000** (PI: **V. Kumar**) Total amount: **$32,000** [Co-PIs: N. Lawrence (UNL), C. Creech (UNL), J.F. Jones (KSU)]
- Comparison of Inzen, igrowth and Double Team sorghum technologies. *The United Sorghum Checkoff Program*. **$10,000** (PI: **V. Kumar**)
- Investigating resistance to auxinic herbicides in Palmer amaranth. *National Corn Growers Association*. **$2500 (Co-PI: V. Kumar)** Total amount: $40,000 [PIs: F. Dayan, T. Gaines, D. Foster, V. Kumar, L. Steckel]
- Investigating resistance to auxinic herbicides in Palmer amaranth. *Cotton Incorporated*. **$2500 (Co-PI: V. Kumar)** Total amount: $60,000 [PIs: F. Dayan, T. Gaines, D. Foster, V. Kumar, L. Steckel]
- Private industry-sponsored research funds for herbicide trials. Multiple sources (Albaugh, Adama, BASF, Belchim, Syngenta, Bayer Crop Science, Monsanto, Corteva Agriscience, FMC, GSC, Gowan, Valent, Nufarm, UPL). **$150,400** (PI: **V. Kumar**)
- In-kind gifts (Herbicides samples and crop seeds). *Bayer Crop Science*. **$5,500** (PI: **V. Kumar**)

## 2020

*Funds Directed to the Program: **($342,895)***

- Integrating best management practices (BMPs) for herbicide-resistant weeds and herbicide stewardship in soybean production (FY21). *United Soybean Board.* **$16,000 (Co-PI: V. Kumar)** Total amount: $993,000 [PIs: B. Young, W.G. Johnson, et al. ….22 co-PIs from 17 Universities]
- Biology and management of feral rye in Kansas wheat production. *Kansas Wheat Commission, Kansas Wheat Alliance, Kansas Crop Improvement Association.* **19,075** [PI: **V. Kumar**]- year 2
- Influence of rainfall on the timing and efficacy of PRE/POST soil residual herbicides for control of herbicide-resistant kochia and Palmer amaranth. *National Sunflower Association*. **$13,000** (Co-PI: V. Kumar) Total amount: **$32,500** [PIs: N. Lawrence (UNL), C. Creech (UNL), J. Spring (CSU), **V. Kumar** (KSU), J.F. Jones (KSU)]- year 3

- Best management practices in soybeans for managing herbicide-resistant weeds in western Kansas. *Kansas Soybean Commission.* **$10,250** (Co-PI: V. Kumar) Total amount: **$17,494** [PI: A. Tucker, Co-PI: **V. Kumar**]- year 2
- Sensitivity of shatter cane and Johnsongrass populations from High Plains grain sorghum production to ALS and ACCase inhibitors. *United Sorghum Checkoff*. **$15,000 [PI: V. Kumar]**
- Effect of nozzle type, spray volume, and boom height on the drift of glyphosate plus dicamba mixture and its efficacy on Palmer amaranth and kochia control in Roundup Ready 2 Xtend soybeans. Monsanto Company. $50,000 [PI: **V. Kumar**, Co-PI: D. E. Peterson]-Year 3
- Geographical distribution of herbicide-resistant kochia in the central Great Plains. NuFarm Company. **$90,000 [PI: V. Kumar]**
- Private industry-sponsored research funds for herbicide trials. Multiple sources (Albaugh, Amvac, BASF, Syngenta, Bayer Crop Science, Monsanto, Corteva Agriscience, FMC, Valent, ISK, NuFarm, Summit Agro, UPL, Winfield United). **$125,070** (PI: **V. Kumar**)
- In-kind gifts (Herbicides samples and crop seeds). *Monsanto Company*. **$5,500** (PI: **V. Kumar**)

## 2019

*Funds Directed to the Program: **($396,196)***

- Developing non-chemical harvest weed seed control strategies in dryland crops. *USDA-NIFA Crop Protection and Pest Management Competitive Grants Program.* **$39,976** (**Co-PI: V. Kumar**) Total amount: **$325,000** [PIs: T. Gaines, V. Kumar, M. Manuchehri]
- Developing Best Management Practices (BMPs) for cover crops to improve soil health in dryland systems in western Kansas. *USDA - Farm Production and Conservation - Natural Resources Conservation Service (NRCS)*. **$5,000** (Co-PI: V. Kumar) Total amount: **74,456** [PIs: A. Obour, J. Hollman, M. Vandeveer, V. Kumar, T. Holmes]
- Skills lost to the age of GMO's, creating IPM leaders to thrive in 21st century farming. *Kansas State University Global Food Systems Seed Grant Program*. **$22,000** (Co-PI: V. Kumar) Total amount: **$50,000 [**PI: S. N. Zukoff; Co-PI: **V. Kumar]**
- Biology and management of feral rye in Kansas wheat production. *Kansas Wheat Commission, Kansas Wheat Alliance, Kansas Crop Improvement Association.* **19,075** [PI: **V. Kumar**]- Year 1
- Non-Xtend soybean response to simulated dicamba drift. *Kansas Soybean Commission.* **$34,217** [PI: D.E. Peterson; Co-PI: **V. Kumar**]
- Best management practices in soybeans for managing herbicide-resistant weeds in western Kansas. *Kansas Soybean Commission.* **$10,250** (Co-PI: V. Kumar) Total amount: **$17,494** [PI: A. Tucker, Co-PI: **V. Kumar**]
- Grass and broadleaf weed control in grain sorghum. *United Sorghum Checkoff Program*. **$9,600 [PI: V. Kumar]**
- Influence of rainfall on the timing and efficacy of PRE/POST soil residual herbicides for control of herbicide-resistant kochia and Palmer amaranth. *National Sunflower Association*. **$13,000** (Co-PI: V. Kumar) Total amount: **$32,500** [PIs: N. Lawrence (UNL), C. Creech (UNL), J. Spring (CSU), **V. Kumar** (KSU), J.F. Jones (KSU)]- Year 2
- Effect of nozzle type, spray volume, and boom height on the drift of glyphosate plus dicamba mixture and its efficacy on Palmer amaranth and kochia control in Roundup Ready 2 Xtend soybeans. *Monsanto Company.* **$50,000** [PI: **V. Kumar**, Co-PI: D. E. Peterson]-Year 2

- Development of dichloprop-p-ethyl for weed control in wheat-fallow. *Nufarm Company*. **$48,000** [PI: **V. Kumar**]
- Private industry-sponsored research funds for herbicide trials. Multiple sources (Albaugh, BASF, Syngenta, Bayer Crop Science, Monsanto, Corteva Agriscience, Arysta, FMC, Gowan, Valent, ISK Bioscience, Nufarm, UPL, Winfield United). **$183,395** (PI: **V. Kumar**)
- In-kind gifts (Herbicides samples and crop seeds). *Monsanto Company*. **$5,500** (PI: **V. Kumar**).

## 2018

*Funds Directed to the Program: **($260,800)***

- Cover crop management options to improve weed control, crop yield and soil health. *US Department of Agriculture (USDA) North Central SARE-Research and Education Program.* **$16,000** (Co-PI: V. Kumar) Total amount: **$200,000** [PIs: A. Obour, J.D. Holman, **V. Kumar**, J. Jaeger]
- Investigation of herbicide resistance in waterhemp and Palmer amaranth in Kansas: survey, mechanism, and management. *Kansas Soybean Commission*. **$65,000** [PI: **V. Kumar**; Co-PIs: M. Jugulam, D.E. Peterson, D. Shoup, P.W. Stahlman]
- Non-Xtend soybean response to simulated dicamba drift. *Kansas Soybean Commission.* **$32,893** [PI: D.E. Peterson; Co-PI: **V. Kumar**]
- Influence of rainfall on the timing and efficacy of PRE/POST soil residual herbicides for control of herbicide-resistant kochia and Palmer amaranth. *National Sunflower Association*. **$13,000** (Co-PI: V. Kumar) Total amount: **$32,500** [PIs: N. Lawrence (UNL), C. Creech (UNL), J. Spring (CSU), **V. Kumar** (KSU), J.F. Jones (KSU)]-Year 1
- Influence of rainfall on the timing and efficacy of PRE/POST soil residual herbicides for control of herbicide-resistant kochia and Palmer amaranth. *Kansas Sunflower Association*. **$5,000** [PI: **V. Kumar**, Co-PI: J.F. Jones]
- Effect of nozzle type, spray volume, and boom height on the drift of glyphosate plus dicamba mixture and its efficacy on Palmer amaranth and kochia control in Roundup Ready 2 Xtend soybeans. *Monsanto Company.* **$50,000** [PI: **V. Kumar**, Co-PI: D. E. Peterson]-Year 1
- Private industry-sponsored research funds for herbicide trials. Multiple sources (Albaugh, BASF, Syngenta, Bayer Crop Science, Monsanto, DowDupont, Arysta, FMC, Gowan, Valent, ISK Bioscience, Winfield Solutions). **$131,675** (PI: **V. Kumar**)
- In-kind gifts (Herbicides samples and crop seeds). *Monsanto Company*. **$5,145** (PI: **V. Kumar**)

# IV. TEACHING AND MENTORSHIP:

Responsible for weed management-related teaching (outreach) to agricultural clientele of Kansas. No formal appointment for classroom instruction. No formal appointment in Kansas Cooperative Extension Service.

## *Courses Instructed (guest lectures and labs)*

- AGRI 621: Weed Science-Fall semester 2017, Fort Hays State University
- AGRI 621: Weed Science-Fall semester 2018, Fort Hays State University
- AGRI 621: Weed Science-Fall semester 2018, Fort Hays State University
- Hosted a weed science class from Fort Hays State University on Aug 28, 2018 and Sep 3, 2019

## *Graduate Students (Advisor/committee member)*

| Student Name | Degree | Year | Department | Institute | My role |
|---|---|---|---|---|---|
| Isaac Effertz | M.S. | May 2019-present | Agronomy | K-State | Co-advisor |
| Monica Marrs | M.S. | May 2021-present | Agronomy | K-State | Co-advisor |
| Sachin Dhanda | Ph.D. | May 2021-present | Agronomy | K-State | Co-Advisor |
| Tyler Meyeres | M.S. | May 2018-May 2020 | Agronomy | K-State | Co-Advisor |
| Lindsey Gastler | M.S. | May 2018-May 2020 | Agronomy | K-State | Committee member |
| Tanner Childer | M.S. | Aug 2018-Dec 2020 | Plant & Soil Sciences | Oklahoma State Univ. | Committee member |
| José Henrique De Sanctis | M.S. | Aug 2018-Dec 2020 | Agronomy & Horticulture | Univ. of Nebraska | Committee member |
| Gurpreet Kaur | Ph.D. | Aug 2018-present | Agronomy | Punjab Agri. Univ. | Committee member |
| Caitlyn Carnahan | M.S. | Aug 2020-present | Plant & Soil Sciences | Oklahoma State Univ. | Committee member |
| Mandeep Singh | Ph.D. | April 2021-present | Agronomy & Horticulture | Univ. of Nebraska | Committee member |
| Srishti Gupta | Ph.D. | March 2021-present | Agriculture Biology | Colorado State Univ. | Committee member |

## *Assistant Scientist/visiting scholars*

- Dr. Rui Liu (assistant scientist) Oct 2018-present.
- Natalie Aquilina (visiting scholar) June 2019-December 2019.

## *Undergraduate Students/Summer Interns*

- Tyce Jerby. Undergraduate student. Fort Hays State University. Mar 2021–present. Project: Practical field experience in weed science
- Hannah Wright. Undergraduate student. Fort Hays State University. Aug 2018–present. Project: Assisting graduate students with greenhouse herbicide resistance screening
- Lauren Dempenwolf. Undergraduate student. Fort Hays State University. Aug 2020–May 2021. Project: Field research on weed biology/ecology and management.
- Cole Walters. Undergraduate student. Fort Hays State University. Aug 2018–May 2021. *Project:* Field research on managing herbicide-resistant weeds.
- Olivia Barber. Undergraduate student. Fort Hays State University. Aug 2019–May 2021. *Project:* Herbicide resistance screening of Palmer amaranth from Kansas
- Larae Boaldin. Undergraduate student. Fort Hays State University. Aug 2018–Dec 2018. *Project:* Greenhouse research on weed biology/ecology.
- Ryan Engel. Undergraduate student. Fort Hays State University. Sep 2017–Dec 2017. *Project:* Evaluating PRE and POST applications of dicamba on dicamba-resistant kochia.
- Peyton Thorell. High school student from Hays, Kansas. May 2018–July 2018. *Project:* Weed control in agronomic crops of Kansas.
- Logan. High school student from Hays, Kansas. May 2018–July 2018. *Project:* Weed control in soybean and corn.

## V. HONORS AND AWARDS:

- **Distinguished Young Weed Scientist (public sector)** award from Northcentral Society of Weed Science (2020)
- **Outstanding Weed Scientist-Early Career (public sector)** award from Western Society of Weed Science (2020)
- **Outstanding Reviewer for Weed Science Journal** award from Weed Science Society of America (2020)
- **Elena Sanchez Memorial Outstanding Ph.D. Student** for the Western Society of Weed Science at Portland, OR, USA (2015)
- **First position in student poster contest** in the Western Society of Weed Science conference at Colorado Springs, CO, USA (2014)
- **Second position in student oral presentation contest** in the Western Society of Weed Science conference at Colorado Springs, CO, USA (2014)
- **Third position in A. K. Dobrenz Student Oral Presentation Competition** in Branch meeting of the Western Society of Crop Science at Bozeman, MT, USA (2014)
- **S. S. Labh Singh gold medal for the first position** in Bachelor of Science in agronomy at Punjab Agricultural University, India (2009)

## VI. PROFESSIONAL SERVICE:

- American Society of Agronomy (ASA); Member: 2010-present
  - i) **Associate Editor** for Agronomy Journal: Sept 2017-present
  - ii) Reviewer for Agronomy Journal and Crop, Forage, and Turfgrass Management
  - iii) Reviewer for Agrosystems, Geosciences & Environment
- Weed Science Society of America (WSSA); Member: 2013-present
  - i) **Associate Editor** for Weed Science Journal: March 2020-present
  - ii) **Associate Editor** for Weed Technology Journal: March 2020-present
  - iii) Active reviewer for Weed Science and Weed Technology journals
  - iv) Chair of environmental aspects & weed management committee (E8):2020-present
  - v) Committee member for outstanding paper award in Weed Technology: 2017-2020
  - vi) Committee member for outstanding paper award in Weed Science: 2016-2019
  - vii) Committee member for Research Priorities (E6): 2018-present
  - viii) Judged graduate students' poster competition in 2018, 2019, 2020 meetings
  - ix) Section Chair for "Formulation, Adjuvant, Application Technology" (2020-2021)
- Western Society of Weed Science (WSWS); Member: 2012-present
  - i) Chaired "Agronomic Crops" session for 2019 and 2020 annual meetings
  - ii) Chair and member of "Herbicide Resistant Plants Committee" (2018-2021)
  - iii) Chair of "Nomination Committee"
  - iv) Judged graduate students' oral and poster papers in 2018, 2019, 2020 meetings
- North Central Weed Science Society (NCWSS); Member: 2017-present
  - i) Member of distinguished achievement award committee: 2017-2020
  - ii) Member on strategic planning committee: 2018-2019
  - iii) Chair for "Weed Physiology and Molecular Biology" section in 2019 meeting

- Chaired a Multistate Research Coordinating Committee and Information Exchange Group (WERA-77) to coordinate research and extension activities on managing invasive weeds in wheat-based cropping systems
- Active member of North American Kochia Working Group (2017- present)
- Active reviewer for the peer reviewed journals: Agronomy Journal, Agronomy, Weed Science, Weed Technology, Pest Management Science, Crop Science, Crop Protection, Journal of Environmental Management, Crop, Forage and Turfgrass Management, PLoS ONE, Journal of Hazardous Materials, Canadian Journal of Plant Science, Weed Research, Science of Total Environment, Scientific Reports

## *Professional Societies Affiliation*

- Weed Science Society of America (WSSA)
- Western Society of Weed Science (WSWS)
- North Central Weed Science Society (NCWSS)
- American Society of Agronomy (ASA)