



Nebraska growers' and crop consultants' knowledge and implementation of IPM of western bean cutworm



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INTRODUCTION

The western bean cutworm (WBC) *Striacosta albicosta* (Lepidoptera: Noctuidae) is a critical pest of maize and dry beans in North America. Current management relies heavily on scouting and the application of broad-spectrum insecticides if above economic threshold and/or the planting of transgenic *Bacillus thuringiensis* (Bt) traits. However, concerns about resistance development to Bt proteins and chemical insecticides have been raised. Stakeholder surveys can be a valuable tool to better understand current IPM practices, identify where management concerns lie, and prioritize educational goals for Extension programming. Therefore, we conducted a survey to analyze how growers and crop consultants in Nebraska understand and practice IPM for WBC, as well as determine the Extension-based needs of these stakeholders.

METHODS

Survey Design

A 40-question survey was developed in Qualtrics software covering six topics: 1) Respondent demographics, 2) Scouting practices & pest ID, 3) Confidence in specific management practices, 4) Bt maize use, 5) Insecticide use, and 6) Biological control & natural enemies.

Survey Distribution

Links were sent to the email distribution lists of the Nebraska Independent Crop Consultants Association (n = 16) and the Nebraska Corn Board (n = 1,290).

Data Analysis

Responses were analyzed using cross-tabulation functions in Qualtrics. Chi-square was used to determine significant response comparisons.

RESULTS:

Western bean cutworm IPM

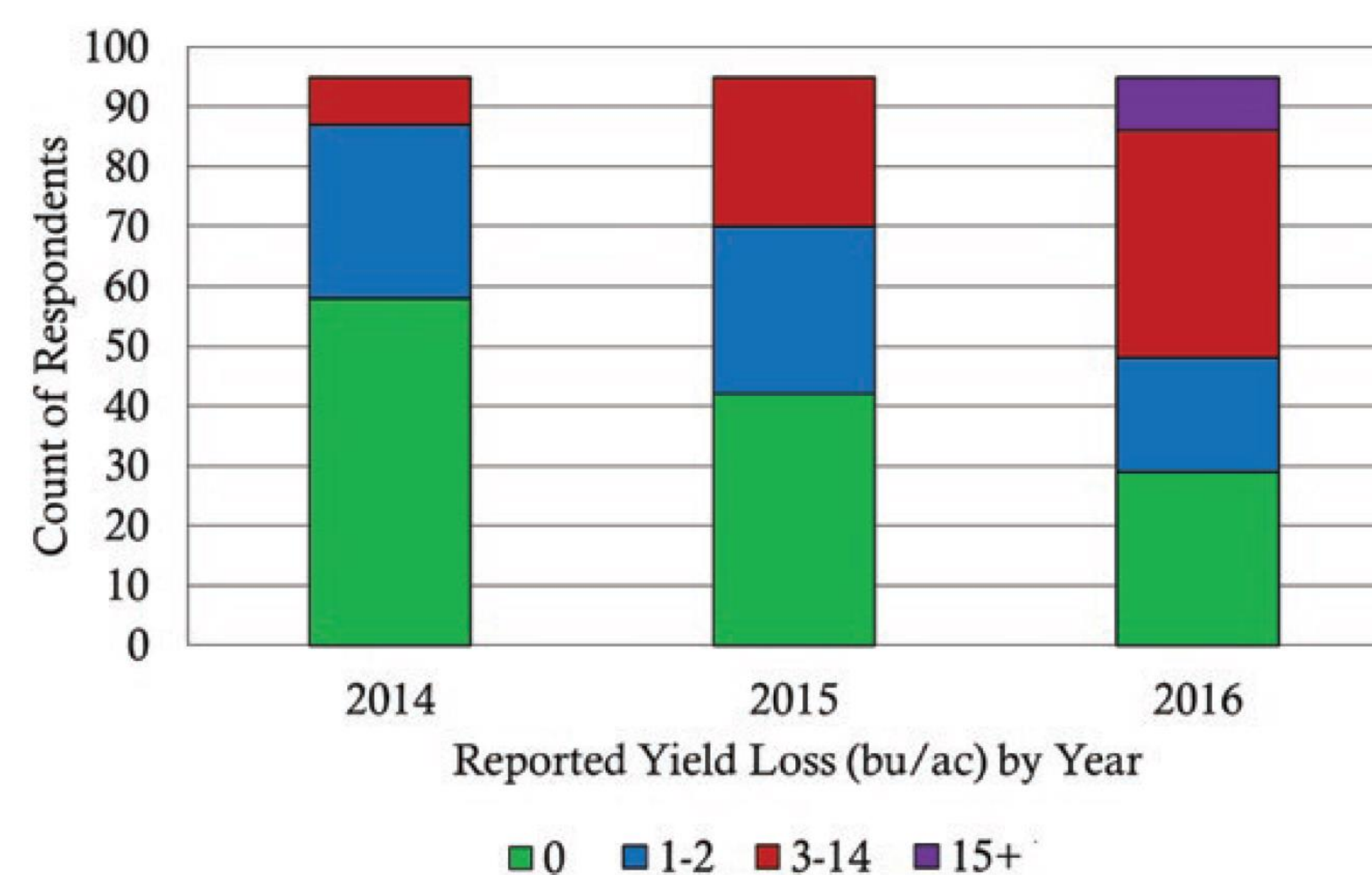


Figure 3. Respondents' reports of average maize yield loss due to WBC by year.

Table 1. Responses to selected questions, by profession.

Survey Question	% Grower	% Crop Consultant	% Other Ag. Prof.
Do you scout the fields you manage for WBC?	32.6	97.5	76.9
Which of the following scouting practices do you employ?			
Look for WBC eggs on upper surfaces of leaves and whorl	71.1	100.0	91.7
Scout fields before or during pollen shed	57.9	100.0	91.7
Scout multiple fields for WBC	60.5	89.7	91.7
Scout at least once a week starting in late June	47.4	89.7	75.0
Check 20 plants in at least 5 parts of each field	52.6	76.9	83.3
Continue scouting for 7-10 days after detecting WBC	39.5	84.6	66.7
Use the light trap data published online by the University of Nebraska-Lincoln	10.5	48.7	75.0
Use pheromone or light traps to see when WBC are flying	7.9	15.4	25.0
Place pheromone or light traps in June before adults	5.3	10.3	8.3
Is scouting effective at informing you about WBC risk?	83.7	100.0	100.0
Respondents were asked to select from an array of photos:			
Correctly chose the WBC eggs	43.9	82.5	50.0
Correctly chose the WBC larva	63.4	92.5	100.0
Correctly chose the WBC adult	24.4	80.0	50.0

Table 2. Bt maize usage

Table 3. Insecticide usage

Trade name	% Using product	% Lower efficacy	Insecticide name	Active Ingredient	% Using product	% Lower efficacy
<u>Cry1F</u>			<u>Pyrethroids</u>			
Herculex XTRA (HXX)	71.6	68.8	Brigade 2EC	bifenthrin	28.1	30.2
Herculex 1 (HX1)	65.7	75	Hero	bifenthrin + zeta-cypermethrin	18.3	53.6
Genuity SmartStax RIB complete	49.3	51.5	Mustang Maxx	zeta-cypermethrin	13.1	30.0
AcreMax Xtra (AMX)	46.3	71	Capture 2EC	bifenthrin	7.8	16.7
AcreMax Xtreme (AMXT)	46.3	74.2	Warrior	lambda-cyhalothrin	7.2	9.1
AcreMax TRIsect (AMT)	38.8	80.8	Pounce 3.2 EC	permethrin	3.3	40.0
TRIssect	25.4	70.6	Hero EW	bifenthrin + zeta-cypermethrin	2.0	33.3
Intrasect	16.4	36.4	<u>Organophosphates</u>			
Agrisure 3122 E-Z Refuge	9.0	16.7	Lorsban Advanced	chlorpyrifos	6.5	0.0
Intrasect Xtra	7.5	60	Chlorpyrifos	chlorpyrifos	5.9	0.0
Intrasect Xtreme	6.0	25	<u>Diamides</u>			
Agrisure Duracade 5122 E-Z Refuge	4.5	0	Prevathon	chlorantraniliprole	4.6	0.0
<u>Vip3A</u>			<u>Carbamates</u>			
Agrisure Viptera 3111	26.9	5.6	Lannate	methomyl	0.7	0.0
Agrisure Viptera 3110	17.9	16.7	<u>Combinations</u>			
<u>Cry1F + Vip3A</u>			Agrisure Duracade 5222 E-Z Refuge			
Agrisure Duracade 5222 E-Z Refuge	6.0	0	chlorpyrifos + lambda-cyhalothrin			
Intrasect Leptra	4.5	0	Cobalt		0.7	0.0

RESULTS: Respondent Demographics

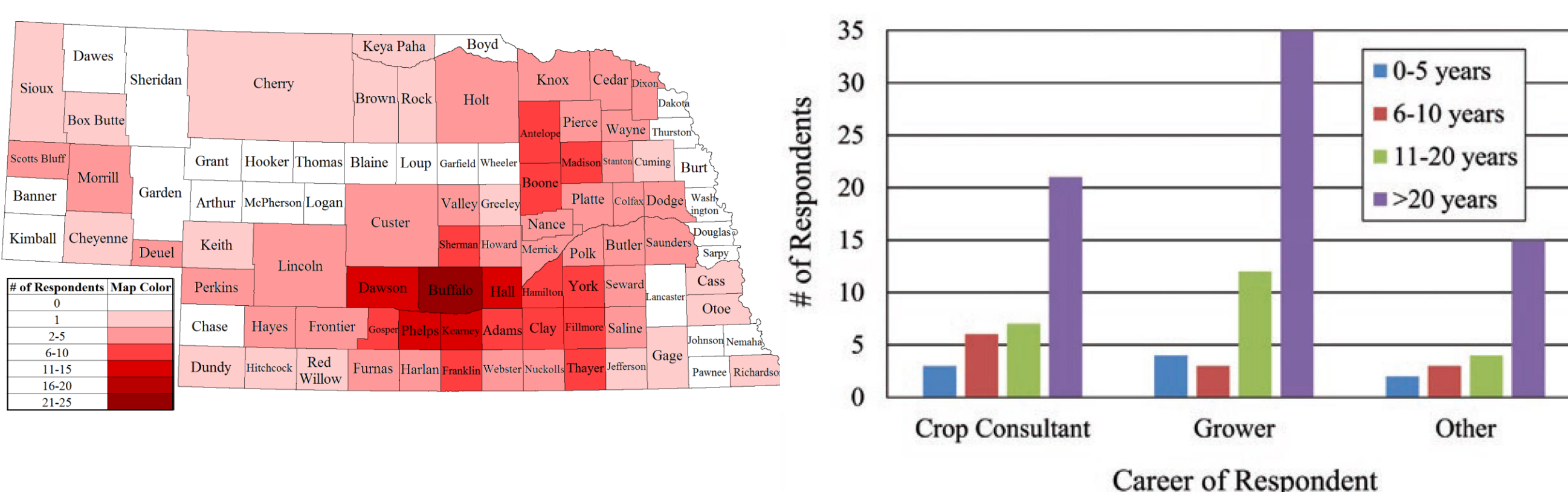


Figure 1. Geographic distribution of respondents across the state of Nebraska.

Figure 2. The agricultural profession of respondents and their time in that position.

RESULTS SUMMARY

- A total of 94 survey responses were completed, representing a wide geography across the state, but concentrated in central NE where intensive maize production is common (Fig. 1).
- Respondents included crop consultants (32%), growers (47%) and other ag professionals (21%) (Fig. 2); the majority (54%) were age 46-64 with >20 years experience.
- Perceived yield loss due to WBC was higher in 2016 compared to 2014 and 2015 ($\chi^2 = 14.80$, $df = 6$, $P = 0.02$) (Fig. 3).
- Crop consultants and other ag. professionals were more likely than growers to scout for WBC ($\chi^2 = 40.41$, $df = 2$, $P < 0.001$) (Table 1); most growers (63%) prefer to hire someone to scout.
- Growers were less likely than crop consultants and other ag. professionals to: follow scouting recommendations, think that scouting was effective, and correctly identify WBC life stages (Table 1).
- Degree-day models are only used by 13.5% of respondents to predict moth flights.
- The majority of crop consultants reported that Bt maize (88%) and pyrethroid insecticides (51%) were less effective than in previous years (Tables 2 & 3).

DISCUSSION

Growers are less involved with scouting and WBC management than crop consultants (similar to findings by Czapar et al. 1995, Wright et al. 1997). Extension education should be tailored to the unique needs of these stakeholder groups. Serious concerns over the performance of Cry1F transgenic Bt traits were evident, corresponding with recent reports of resistance to this trait (Ostrem et al. 2016; Smith et al. 2017). Concerns over pyrethroid performance were also evident. Resistance management should be a critical focus for both research and extension efforts for this pest. Acceptance of biological control as a component of western bean cutworm IPM is promising: 64% of growers replied that they would want to use insecticides that are less toxic to predators if they knew which ones those were.



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