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CORN: *Zea mays* L. 'Pioneer P1395XR', 'Pioneer P1395AM1', 'Pioneer P1395HR'

ROOTWORM TRAITED, REFUGE IN A BAG AND REFUGE CORN HYBRIDS IN COMBINATION WITH CAPTURE LFR AT PLANTING FOR LARVAL CORN ROOTWORM CONTROL, 2012

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Western corn rootworm (WCR): *Diabrotica virgifera virgifera* LeConte

Research trials testing rootworm traited, refuge in a bag and refuge field corn hybrids in combination with Capture LFR insecticide at planting were conducted near Clay Center, NE to evaluate their effectiveness for larval corn rootworm (CRW) control during 2012. Trial site was a mixture of late-planted corn and pumpkins (insecticide free) during 2011. Experimental design was a RCB with 6 replicates. Plot size was 4 rows x 45 ft length in 30-inch row spacing. Soil type was a Crete silt loam. The corn hybrids tested originate from the same genetic family. 'Pioneer P1395XR' (HXtra; contains Herculex XTRA insect traits), 'Pioneer P1395HR' (HXI; contains Herculex I insect traits), and 'Pioneer P1395AM1' (AcreMax1; refuge in a bag, contains 90% Pioneer P1395XR [HXtra] and 10% Pioneer P1395HR [HXI] insect traited seed) corn hybrids were planted on 26 Apr with a 4-row Kinze planter with finger pickup seed units. Pioneer P1395XR and P1395HR corn hybrids received a seed-applied insecticide treatment of thiamethoxam @ 0.25 mg/kernel. Pioneer P1395AM1 corn hybrid received thiamethoxam @ 0.25 mg/kernel on the P1395XR hybrid portion and clothianidin @ 1.25 mg/kernel on the P1395HR hybrid portion. A southeast wind @ < 10 mph occurred at planting. Capture LFR was applied with an electric pump system and directed into the open seed furrow in a 5 GPA water solution via the starter fertilizer tubes (IF). Initial CRW egg hatch occurred on approximately 08 May. Plant populations within the center 2 rows of each plot were evaluated on 14 May. The total number of plants was recorded and converted to plants per acre. The total number of early season root lodged plants and dead plants due to larval corn rootworm feeding in the center 2 rows of each plot were recorded on 27 Jun. Larval feeding damage was evaluated on 05 Jul. Five randomly selected plants from the outer 2 rows were dug from each plot, washed, and rated

using the Iowa State 0-3 scale (0 = no feeding, 1 = one node of roots pruned to within 1.5 inches of the stalk, 2 = two nodes of roots pruned to within 1.5 inches of the stalk, 3 = 3 or more nodes of roots pruned to within 1.5 inches of the stalk). The total number of pre-harvest root lodged plants and plants with harvestable ears within the center 2 rows of each plot were recorded on 17 Sept. The center 2 rows of each plot were machine harvested on 25 Sept. Percent moisture and lbs of grain were recorded and corrected to 56 lbs/bu @ 15.5% moisture. Data were analyzed by PROC MIXED with mean separation using differences of least square means (P = 0.05).

From planting (26 Apr) to larval feeding damage evaluation (05 Jul), rainfall totaled 8.55 inches and overhead irrigation, 3.12 inches. Larval CRW densities were high, with mean root injury ratings (Iowa 0-3 scale) in the untreated HXI corn hybrid plots, averaging 2.47 (Table 1). All treatments significantly enhanced larval CRW protection based on root injury ratings, reduced early season and pre-harvest root lodging, and reduced the number of dead plants due to larval CRW feeding compared to the untreated HXI corn hybrid plots (Tables 1 & 2). Furthermore, grain yield levels were significantly increased by a minimum of 44.7 bu/acre by the treatments compared to the untreated HXI corn hybrid plots (Table 2). Applications of Capture LFR at planting to HXtra and AcreMax1 insect traited corn hybrids did not significantly improve root injury protection or grain yield levels (Table 1 & 2). This research was supported by industry gifts of seed, pesticides and research funding.

Table 1.

Treatment[a]/Formulation	Rate-amt form/ 1000 row ft	Placement[b]	Plants/ Acre[c]	Early Season No. of Root Lodged Plants[c]	No. of Dead Plants[c]	Root Injury Rating[c]
HXtra + Capture LFR	0.49 fl oz	IF	24,760 bc	0.5 a	0.2 a	0.10 a
HXtra			24,092 c	0.0 a	0.0 a	0.18 ab
AcreMax1 + Capture LFR	0.49 fl oz	IF	25,661 ab	0.8 a	0.3 a	0.36 ab
AcreMax1			25,695 ab	11.0 a	0.0 a	0.41 b
HXI			25,893 a	112.7 b	16.3 b	2.47 c
			0.0028	<0.0001	<0.0001	<0.0001

Table 2.

Treatment[a]/Formulation	Rate-amt form/ 1000 row ft	Placement[b]	Pre-harvest No. of Root Lodged Plants[c]	No. of Plants w/ Harvestable Ears[c]	Yield[c] (bu/acre)
HXtra + Capture LFR	0.49 fl oz	IF	0.3 a	121.0 a	207.8 a
HXtra			0.2 a	120.5 a	207.0 a
AcreMax1 + Capture LFR	0.49 fl oz	IF	1.0 a	128.5 a	220.0 a
AcreMax1			3.7 a	128.2 a	216.3 a
HXI			82.7 b	101.8 b	162.3 b
			<0.0001	0.0003	0.0003

[a]AcreMax1, refuge in a bag corn hybrid, ‘Pioneer P1395AM1’ corn hybrid contains 90% Pioneer P1395XR and 10% Pioneer P1395HR corn hybrids; HXI, ‘Pioneer P1395HR’ corn hybrid contains Herculex I insect traits; and HXtra, 'Pioneer P1395XR’ corn hybrid contains Herculex XTRA insect traits.

[b]IF, liquid insecticide directed into the open seed furrow in a 5 GPA water solution.

[c]Means in column followed by the same lower case letter are not statistically different using the differences of least square means (MIXED; p|t|>0.05.

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Brand Name	Formulation	Common Name	Composition	Manufacturer
Capture	LFR	bifenthrin	2-methylbiphenyl-3-ylmethyl (1*RS*,3*RS*)-3-[(*Z*)-2-chloro-3,3,3-trifluoroprop-1-enyl]-2,2-dimethylcyclopropanecarboxylate	FMC 1735 Market Street Philadelphia, PA 19103