

**Buffalo, Kikuyu, and Couch, are easily damaged by lawn grub,  
while Zoysia types have resistance**

**EMPIRE™ Zoysia japonica 'SS500'  
has resistance to lawn grub in Australia**

Armyworm, Webworm and Cutworm devastate lawns around Australia every year

**Empire is the safer choice.** See scientific research below showing Zoysia has resistance to lawn grub.

From the NSW DPI

Army worms have invaded South Coast pastures.

Industry and Investment NSW (I&I NSW) agronomist at Berry, Craig Muir, has been responding to dozens of farmers **who have seen grass disappear from their paddocks almost before their eyes.**

From the Hunter Valley Gardens web site

Lawn army worm can be a problem too and **can cause a lawn to disappear literally overnight.**

The Chronicle News Paper Qld

'TOOWOOMBA'S homes, lawns and gardens are being invaded by an army of creepy crawlies and moths... **the "army worm", ... could wreak havoc on even the most well-kept Toowoomba lawns.** '

**If you are worried about lawn grub making your lawn disappear  
before your eyes, then choose a Zoysia type**

Listed below are many scientific papers that show Armyworm, Webworm, and Cutworm will usually leave Zoysia types alone. In fact many scientific papers show that the Zoysia has a harmful effect on the colonies of lawn grub. Lawn care professionals have seen first hand torrents of Armyworm eat all the lawns in a street, except for the Empire Lawns. EMPIRE™ Zoysia japonica 'SS500' has been the last lawn standing on many occasions.

One research scientist said that on their research plots the Armyworms go after the couch first, then the Kikuyu and Buffalo, and they mainly leave the Zoysia types alone. They may munch a little

around the edges, but the *Zoysia* types remain mainly unaffected.

Daniel from Barefoot lawn care said, he has seen first hand how Buffalo, Couch and Kikuyu lawns have been stripped bare by Army worm, yet the Empire lawns in the same street were unaffected.

## WHAT ARE LAWN GRUBS?

They are basically leaf eating caterpillars.

The main 3 types:

- **Armyworm** (*Spodoptera frugiperda*) is part of the order of Lepidoptera and is the caterpillar life stage of a moth. It is regarded as a pest and can wreak havoc with turf if left to multiply. Its name is derived from its feeding habits. Armyworms will eat everything in an area and once the food supply is exhausted the entire "army" will move to the next available food source. Some lawn types are resistant, particularly *Zoysia* types. Armyworm caterpillars are dark green, smooth and hairless, 25 to 300mm long with distinctive stripes along the sides of their body, often feeding at night through the growing season. From 1 to 6 generations may occur in the course of a normal growing season depending on conditions.

- **Webworms** have a bivoltine life cycle with four stages: egg, larva, pupa and imago (adult). They overwinter as larva in their final or penultimate instar in the thatch or soil. With the coming of warmer weather, the larva will pupate, and moths will appear in late spring or early summer. This particular grub is greyish to tan in colour, about 20mm long and spotted, also feeding at night through the warmer months. The adult moth drops her eggs at random during the night, then the eggs hatch in one week. They usually chew off leaves near the base of the sheath.

- **Cutworms**. These are thick bodied caterpillars with a length of 38 to 50mm. These caterpillars are greenish grey, brown or black often with spots or stripes. They can chew the grass shoots down to the surface but are usually considered a minor problem.

## RESEARCH PAPERS

Resistance of zoysia grass (*Zoysia* spp.) to fall army worm (Lepidoptera: Noctuidae): Leaf tensile strength and cell wall components

Trent Hale, Texas AgriLIFE Res. & Ext. Urban Solution Center, 17360 Coit Road, Dallas, TX, and Richard H. White, Texas A&M University, Department of Soil & Crop Science, College Station, TX.

Leaf toughness and high levels of detergent fiber, lignin and silica in leaf sheaths have been associated with insect resistance in many crops. Experiments were conducted on the effects of sample date and level of N treatment on the concentrations of lignin and silica and on tensile strength of zoysiagrasses (*Zoysia* spp.) leaves to compare their relationship to fall armyworm [*Spodoptera frugiperda*] host resistance. Six zoysiagrass cultivars 'Cavalier', 'Crowne', 'Emerald', 'El Toro', 'Meyer' and 'Palisades' were planted on a fine, montmorillonitic, thermic Vertic Albaqualfs soil at the Texas A&M Univ. Turfgrass Field Laboratory in College Station, TX. A randomized split-plot design with four reps and with N applied as (NH<sub>4</sub>)<sub>2</sub>SO<sub>4</sub> at 12.2 kg and 48.9 kg of N ha<sup>-1</sup> month<sup>-1</sup> throughout the growing season was used. Fiber analysis supported literature reports that cell wall structural components are associated with insect resistance. This study

demonstrated that lignin concentration and leaf tensile strength were positively correlated with fall armyworm mortality determined by two types of feeding experiments and that cell wall and hemicellulose concentration in these *Zoysia* cultivars were positively correlated with applied N.

Grass species and endophyte effects on survival and development of Fall Army Worm.

S. K Bradman et al. Department of entomology, University of Georgia.

...larval weights were greatly reduced by feeding on any of the *Zoysia* grasses.

Fall Armyworm response to insecticides: Influence of Turf type.

S.Kristine Bradman et al.

University of Georgia.

Trend to lower survival of army worm on *Zoysia* grass.

Quantitative utilization of selected grasses by fall armyworm larvae

N. T. Chang, R. E. Lynch, F. A. Slansky, B. R. Wiseman and D. H. Habeck

Showed that Armyworm larvae is harmed by *Zoysia* grass.

Resistance in zoysiagrass (*Zoysia* SPP.) to the fall armyworm (*Spodoptera frugiperda*)  
(Lepidoptera: Noctuidae).

Reinert, James A.; Engelke, M.C.

*Zoysia* grass was found to be resistant to Army Worm and Web worm.

Flavonoids of Zoysiagrass (*Zoysia* spp.) Cultivars Varying in Fall Armyworm (*Spodoptera frugiperda*) Resistance

William F. Anderson, Maurice E. Snook, and Albert W. Johnson  
Agricultural Research Service, U.S. Department of Agriculture

This paper showed that *Zoysia* types in general are resistant to Armyworm.