Introduction
The tobacco aphid, a tobacco-adapted form of the green peach aphid, Myzus persicae (Sulzer), is the most important insect pest of tobacco in Virginia (Fig. 1a). Serious infestations can reduce tobacco yield and value by more than 25%. The tobacco flea beetle, Epitrix hirtipennis (Melshimer), (Fig. 1b, 1c) is an important early-season pest that affects tobacco growth, stand uniformity, and may reduce yield.

Fig. 1. a. Tobacco aphid (a), b. and c. tobacco flea beetles on leaf.

Conservation tillage has been used to reduce soil erosion in many crops over the past 40 years, but its use in tobacco production has been limited. Conservation compliance requirements with recent advancements in herbicides and tillage equipment has increased interest in conservation tillage.

Objective
To determine the impact of conservation tillage methods, cover crop, and insect management practices on the incidence of the tobacco aphid and the tobacco flea beetle on tobacco and to assess their impact on tobacco yield.

Materials and Methods
- Two field experiments were conducted in 2004, one in a wheat cover and one in a sorghum cover. Experiments were established in split-plot design with tillage method as the main plot and insect control methods as subplots.
- The 2005 experiment was arranged in a randomized block split-plot design with three cover crops, three cultivation methods, and three insect management treatments.

Cover Crops: 2004
- Wheat: seeded in the preceding October
- Sorghum: crop residues from 2003
- Soybean: crop residues from the preceding year

Cover Crops: 2005
- Wheat: seeded in the preceding October
- Sorghum: crop residues from the preceding year
- Soybean: crop residues from the preceding year

Production system and cultivation method
- No-till: Tobacco was transplanted directly into the cover crop or crop residue treated with paraquat to kill the cover and weeds (Fig. 2a). The crop was cultivated twice before later cultivation (Fig. 2b).
- Strip-till: Crop was transplanted into 30-cm cultivated strips within a killed cover crop. The crop was cultivated twice before later cultivation (Fig. 2b).
- Conventional till: Tobacco was transplanted flat into plowed field and cultivated three to four times (Fig. 2c).

Insecticidal treatments
- Aldicarb (Temik) 15G, 22.4 kg/A (2 bands) in 2004 and 2005 + acephate (Orthene) 97WG, 860 g/ha, foliar spray, 2005
- Acephate 97WG, 860 g/ha in the transplant water + acephate 97WG, 860 g/ha, foliar spray, 2004
- Imidacloprid (Admire) 12F, 244 ml/A (tray drench), 2004 and 2005
- Untreated check, 2004 and 2005

Insect counts
- Total flea beetles and flea beetle feeding holes on the most damaged leaves were sampled on 10 plants per plot at 7-day intervals.
- Aphid populations were estimated on four upper leaves of 10 plants per plot at 6- to 10-day intervals.

Statistical analysis
Data were analyzed using Proc GLM (SAS 1987) for a randomized split-plot design in 2004 and a randomized split-split-plot design in 2005. Means were separated with Student-Newman-Keuls test (P<0.05).

Results: Tobacco Aphid
- Aphid populations were very high in the 2004 (Fig. 3, 4) and very low in the 2005 (Fig. 5).
- In 2004, the no-till and strip-till plantings into wheat cover and sorghum residue had much lower aphid populations than conventionally-tilled tobacco from mid-June through 21 July (Fig. 3, 4).
- Aphid population trends were similar in the wheat covers in 2004 and 2005 (Fig. 3, 5).
- Aphid populations on tobacco grown strip-till in the sorghum and soybean residues were higher than those on tobacco transplanted into the wheat cover in 2005 (Fig. 5).
- In 2005, aphid populations were much lower on tobacco transplanted no-till or strip-till into the wheat cover than those on those on tobacco grown in sorghum and soybean residues (Fig. 6).
- Each year, soil applications of aldicarb, transplant drench applications of acephate, and transplant water plus foliar applications of acephate excellent control of aphids each year.

Summary
- Conservation tillage, strip-til and no-till transplanting into a wheat cover was associated with low populations of the tobacco aphid and a reduction in tobacco flea beetle feeding damage.
- The use of a wheat cover in conservation tillage resulted in less flea beetle feeding damage and lower aphid populations than sorghum and soybean covers.
- Imidacloprid drench treatments, acephate foliar sprays, and aldicarb soil treatments gave excellent control of the tobacco aphid, but only imidacloprid provided adequate reductions in flea beetle damage.