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## *New Technologies in Mulching for Vegetable Production in Florida*<sup>1</sup>

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Polyethylene (plastic) mulch is a very important component in successful vegetable production in Florida. Mulching is used in the production of nearly all tomato, pepper, eggplant, strawberry, and muskmelon in Florida, and for most watermelon and cucumber crops. There are nearly 80,000 acres of mulched vegetables in Florida, making Florida a leading state in the use of plastic mulch. The two most commonly used mulches in Florida are black and white-on-black plastic films, however, there are newer types of mulches being developed to meet special needs in vegetable cultural systems. Four new types of mulches are being adopted by Florida growers and are described in this article.

**Highly reflective mulches**, or “metallized” films (figure 1) are being used by vegetable producers, especially tomato producers in northern Florida and southern Georgia to repel insects that transmit virus diseases. The effectiveness of reflective mulches in repelling insects, such as aphids, has been reported in early research literature, but the widespread use of films for this purpose did not take place because of the availability of effective, inexpensive pesticides. Today, however, the use of highly reflective mulches plays an important role in modern insect and disease management. Following research protocols developed by scientists at the UF-IFAS North Florida Research and Education Center-Quincy, tomato growers are using reflective films on tomato beds to repel thrips that transmit the tomato spotted wilt virus. The films in use are aluminized black or white polyethylene films with a highly reflective aluminized surface. The effectiveness of the metallized films in reducing tomato spotted wilt disease is dramatic. The metallized film is a very important component in the production of tomato with greatly reduced insecticide inputs. In fact, the spraying of pesticides at typical rates results in spray deposition on the reflective surface and reduces the effectiveness of the films. Reflective films add modestly (extra \$200 per acre) to the costs of tomato production, compared to standard black films, but the new mulch can mean the difference between 5% tomato spotted wilt incidence and 25% incidence.

**Colored plastic mulches** (red, blue, yellow, brown, etc.) have recently gained interest among researchers looking for technologies to control crop growth and

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yield (figure 2). In the last 10 years, there have been many trials over the country, evaluating the effectiveness of colored films for vegetable production. Research results with colored films have been mixed and inconsistent. Some research has indicated control over plant height and plant structure can be controlled by certain colored films that vary the reflected light quality in the plant canopy. Some colored films have been implicated in reducing insect populations on plants. Some research has even matched mulch color with crops giving best yield responses, for example red for tomato (although not in Florida) and blue for potato. Early colored-film quality and effectiveness were inconsistent, but newer-generation colored films are being tested. Colored films are interesting from the standpoint that they might be used to provide control of plant growth and development resulting in improved yields and better fruit quality. So far, results have been too inconsistent to be able to make broad recommendations. Growers should try these films on the farm and compare to the standard black or white-on-black films currently in use.

**Virtually impermeable films** (VIFs) are being developed in conjunction with the testing of new production practices in preparation for the loss of the soil fumigant, methyl bromide. Standard polyethylene mulch films allow for the passage of gaseous materials such as methyl bromide, but the VIF is manufactured to reduce or eliminate the loss of gaseous soil fumigation materials. These films are being tested in research to determine alternative chemical soil fumigation practices. VIFs are a little more difficult to apply to the raised vegetable beds due to their inherent stiffer nature and lack of embossing. However, VIFs are very effective in containing soil gaseous chemicals, possibly leading the way to reduced rates of soil-applied pesticides. The economics of VIFs have not been totally worked out, but the cost is about twice that of standard polyethylene films, and the cost should fall with increased use.

Paper mulches (figure 3) have come full-circle since their early commercial introduction in the late 50s. Paper mulches are bulky and rather expensive at present, but offer great potential for vegetables for several reasons. Paper mulches (brown or black) are degradable and can be incorporated in the soil at the end of the season. Considerable research on paper mulches has been conducted over the last 10 years at the UF-IFAS North Florida Research and Education Center-Suwannee Valley at Live Oak. Crop response has generally been similar to that with black or white-on-black plastic films. The big challenge with paper mulches is controlling the degradation rate of the paper, especially at the tuck area of the bed. If the paper degrades prematurely at the tuck area, the mulch can be blown from the bed. Various approaches have been tried to deal with this problem, including various coatings or additives to the paper. Paper mulch can be applied with standard plastic film application

equipment with minor adjustments. One interesting aspect to paper mulches observed in the research at NFREC-Suwannee Valley is that nutsedge will not penetrate the paper. Nutsedge will be a major challenge in plastic mulch systems after the phase-out of methyl bromide.

Mulching has been a very important factor in the advancement of the vegetable industry in Florida and UF-IFAS scientists have been leading the development and adaptation of mulching technologies for the vegetable industry. The plastic film industry has brought new plastic films into commercial use and made advancements in current mulch films, such as the introduction of high-density polyethylene. Mulching will continue to be a very important component of profitable vegetable production and new mulch systems will allow Florida vegetable producers to continue to compete successfully in the marketplace. For more information on mulches for vegetable production, please contact one of the authors at 850-875-7144 or 850-875-7100, or 386-362-1725, or visit our website at <http://nfrec-sv.ifas.ufl.edu>.



Figure 1. Highly reflective metallized mulch with black strip for soil heating, UF-IFAS NFREC-Quincy.



Figure 2. Various colored films applied to vegetable beds at UF-IFAS NFREC-Quincy.



Figure 3. Paper mulch on a pepper bed in Live Oak, FL