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PROGRESS REPORT TO:

North Carolina Peanut Growers Association
National Peanut Board

TITLE: Harvesting Effectiveness of Peanut Diggers

LEADER(S): Gary T. Roberson

DEPARTMENT(S): Biological and Agricultural Engineering

REPORT: A series of tests were conducted at Peanut Belt Research Station and at Upper Coastal Plains Research Stations in the 2005 harvest season focusing on digger performance at a range of ground speeds from 1 to 4 miles per hour. The objective was to optimize performance of the automatic chain control system developed in previous years. A two-row KMC digger was equipped with a Mid-Tech Legacy 6000 automatic control system for this test. Chain Speed was maintained by the control system at a preset optimum value relative to ground speed. Preliminary analysis of the results indicates fairy consistent performance of the digger at speeds up to 3 miles per hour. However, at 4 miles per hour, digger losses increased significantly. Further analyses of the data are needed to insure correct interpretation. The data suggest that it may be more cost effective for farmers to operate at speeds near 3 mph rather than the extremely slow speeds. The loss reduction at the slowest speeds may not be enough to offset the cost of added time in the field with the tractor and digger.

In addition to the chain speed testing, tests were conducted comparing diggers with "V' inverters and straight inverters. "V" inverters have the kicker wheels in the inverter section mounted on independent shafts with a downward angle of approximately 30%. Straight inverters have the kicker wheels mounted on a common horizontal shaft. Diggers were compared on tests on private farms in 2005. Two 4-row Amadas diggers, identical expect for inverter design were compared side by side in the field. Operating parameters were kept identical as much as possible. No significant difference in harvest losses were observed between the two digger designs.

A revised design for the inverter section was developed and preliminary tests conducted in 2005. The inverter design modification calls for an adjustable angle on the inverter wheels, variable speed hydraulic drive, and indexable inverter rods. The adjustable feature of the inverter was successfully designed and installed on a digger frame. The section can convert from a 30 degree down angle to horizontal in a matter of minutes. Horizontal positioning of the inverter under the chain is adjustable as well. Likewise, the variable speed hydraulic

drive worked successfully. Speed of the kicker wheels could be maintained consistently with respect to the speed of the shaker chain. Unlike conventional diggers where a belt drive runs between the shaker chain and the kicker wheels, the hydraulic drive allows the farmer to adjust kicker wheel speed to optimize performance for digging conditions. The indexable inverter rods are still under development. Preliminary field tests with the inverter design were marginally successful. Problems were experienced in the vines releasing from the chain properly, which may not be related to the inverter design. Further development of the inverter and shaker chain interface is planned.

Field work in 2006 was focused on blade design comparisons. A 2-row KMC digger was fitted with a standard blade and finger setup as well as an Ubly blade and finger setup. In two fields, the conversion was accomplished by switching the blade and finger combination on the original KMC frog and standard. This did not allow the recommended spacing that Ubly required for their finger to chain interface. In the third field, a modified standard was utilized with allowed for an increased spacing between the fingers and the shaker chain which complied with the Ubly recommendation. In the first two fields, the Ubly blades showed a digger harvest loss decrease of 23% (39.2 LB/AC) and 4% (2.5 LB/AC) respectively. In the third test, harvest losses due to the digger were observed to be 27% (11.9 LB/AC) less than the standard KMC configuration. However, when the losses due to shedding were included, a comparison of total harvest loss showed an increase for the Ubly blade of 7% (34.5 LB/AC) for one field and a decrease of 24% (32.8 LB/ AC) and 12% (8.1 LB/AC) for the remaining two fields. It is difficult to clearly ascertain if harvest losses are due solely to the digger, solely due to shedding or may be a combination of the two. Further analysis of the data will be undertaken and further testing may be necessary to fully explain the results.

Design work has been initiated on a revised shaker chain and inverter system. The goal of the revised design is to improve the flow of peanuts from the shaker onto the inverter, thereby reducing harvest losses. A prototype will be prepared for testing in 2007.