

**NEW MOWING MACHINES FOR GRASSLAND MANAGEMENT  
ON AIRFIELDS OF THE GERMAN AIRFORCE**

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**Abstract**

An efficient long-grass management on airfields with maintaining grass heights of 20 cm and more needs mowing machines adjustable to the required heights. Using the mulch technique chaff length should not exceed 5 cm in order to ensure an optimum spread amongst the stubble. In the recent years new tractors towing mowing machines achieving these requirements were introduced on several airfields of the German Air Force. The effective operating width of the mowing machines is 5.20 m, their working speed ranges from 4 to 8 km/h, i.e. 2 to 4 ha can be mown per hour. After the first operations still some components of the mowing machines had to be adapted to the specific requirements of long-grass management.

**Key Words:** Habitat management, Long-grass management, Mowing machines

## 1. Introduction

On the airfields of the German Air Force in the northern parts of Germany the lapwing is very frequently involved in bird strikes. The lapwing (*Vanellus vanellus*) is a wader species widely distributed in the Palearctic region. It is considered as a hazardous species for flight safety due to its size and weight ( $\pm 200$  g) and its habit of forming large flocks outside the breeding season. If Lapwings are scared with pyroacoustics they show unpredictable flight manoeuvres.

On airfields in the middle and southern parts of Germany the lapwing is mostly restricted to migration periods, but on the airfields in the north German low land the lapwing can be found year-round depending on the weather conditions. The species only leaves the region by long lasting snow cover and/or spells of frost. It either uses the airfields for breeding and/or for feeding and roosting. The lapwing is frequently involved in bird strikes on airfields in the northern parts of Germany. In the years 1985 – 1996 on Schleswig-Jagel airfield (located in Schleswig-Holstein near to the Baltic sea) lapwings represented 36 % from all identified bird species involved in bird strikes during take off and landing.

In former years long grass as a repellent for birds on airfields was highly recommended (Brough & Bridgeman, 1980, Hild, 1978, Maron, 1977). Recent investigations in North America (Seamans et al., 1999) showed that not all bird species which are a hazard for flight safety are affected by long grass in a negative way. These authors mention that the use of tall grass needs to be determined on a species- and site-specific basis.

The habitat for the lapwing has been systematically investigated over a long period. Although in the past century there was a shift from natural to agricultural land the habitat demands of the lapwing remained the same: It prefers flat, not enclosed terrain affording unbroken all-round view with missing or short vegetation (Bezzel, 1985, Cramp, 1983, Weitz, 1983). Therefore the maintenance of airfields with the long grass technique is very effective against lapwings (Milsom & Rochard, 1987). But not inevitable against other bird species, e. g. Canada geese (Seamans et al., 1999).

In 1996 the mechanical equipment of the agricultural section responsible for the maintenance of Eggebek and Schleswig-Jagel airfield had partly to be replaced. Up to this date a long grass management was not possible with the existing equipment. The grass was cut short and removed two to three times per year (Griebel, 1999).

A discussion took place how to manage the airfields before purchasing new equipment. Theoretically long grass can be achieved in two ways:

- a) by cutting the grass at a height of 20 cm or above followed by a removal and deposition of the mown grass once or twice per year

- b) by using the mulch technique cutting the tips of the grass 4 – 6 times per year. The cuttings are left on the airfield between the stubble where they rot.

For two reasons the mulch technique was preferred: On the one hand there is no equipment available which cuts the grass at a height of 20 cm or above and picks it up without flattening the vegetation and therefore eliminating the long grass effect. On the other hand the mulch technique is the more economical and ecological method because no costs for the removal and deposition of the cutting are arising and the biological cycle is not interrupted due to the fact that the nutrients are again supplied to the soil.

## 2. Machine Technique

An optimal long-grass management requires an effective, powerful equipment. This is especially essential for the period in spring and early summer when the growing of the grass increases considerably.

The optimal equipment should fulfil the following requirements:

- Tractor with change-under-load transmission, a front mounting flange and broad wheels in order to reduce the ground-pressure
- Mulch machine with specially designed cutting knives ensuring that the chaff lengths does not exceed 5 cm in order to ensure an optimum spread amongst the stubble. Supporting wheels for a variable distance selection between 5 and 25 cm and a working width of at least 5 m to keep the number of tracks low
- Hydraulic operation of the equipment and a comfortable tractor cabin to ensure one-man operation and shift work
- Essential is the presence of a most effective and reliable trade partner nearby offering a 24 hour repair service.

In consideration of these requirements the agricultural section of Eggebek and Schleswig-Jagel airfield (together 600 ha of long-grass area) in 1996 ordered two units with the following components:

- CASE-tractor with 115 kW and change-under-load transmission
- TRIPLO mulch machine (Fa. Votex). The mulch equipment consist of three parts. A mulch machine for front mounting with a working width of 2,60 m and a two heck mounted parts (to be lifted up hydraulically when not in use) with 2 m each. Because of the necessary overlapping of the three parts there is an effective working width of 5,20 m.

Cost of the two units: 480.000 DM ( \$ 240.000)

### 3. Operational Experiences

Up to now in Europe there is no standardised technique available capable to fulfil the specific requirements of the long-grass management with cutting heights of 20 cm or more. Therefore after the first operations some components of the above mentioned standard mowing machines had to be adapted to the specific requirements:

- Standard mulch machines use supporting rolls to adjust the distance between machine and ground but they only allow to choose between a distance of 5 to 8 cm. Another disadvantage is that through the pressure of the rolls the grass will be flattened.
- A mowing height of 20 cm or more can only be achieved by using supporting wheels instead of rolls. The use of supporting wheels leads to other kinetic conditions and changes in load. The praxis showed that the frames of the supporting wheels broke in the course of time. Therefore it was necessary to stiffen the frames.
- In order to get very fine cuttings to ensure an optimum spread of them between the stubble the machines have to be operated with high rotation speeds (1000 – 1500 RPM). A high rotation speed leads to a vibration stressing of the machine and can result in the cracking of line of welds and supporting frames. Therefore an optimal balancing of the machine (especially after exchanging the cutting-knives) is absolutely necessary.
- The adjustment of different cutting heights has to be done by hand (via the setting screws of the supporting wheels) and is a intricate work. It is intended to install an opto-electronical distance detector which sets and holds a preselected height automatically via the hydraulic system of the tractor/mower-unit. Such a system would also be capable to ensure an optimal adaption of the running mowing machine to elevations and depressions of the soil surface (terrain following).

The optimal working speed varies between 4 and 8 km/h. On condition that no complications occur 2 to 4 ha can be mown per hour, resulting in a performance of 12 to 24 ha per man and day.

A mulch machine mounted on the front of the tractor is indispensable.

Working only with a heck mounted mower means that the grass in the tracks of the tractor wheels will be flattened and therefore cannot be grasped by the cutting knives.

Practising an effective long grass management will not work properly if the operating times are fixed early in advance. The operations have to be adapted to the actual growth rate of the vegetation. The experiences in Schleswig-Jagel showed that the amount of vegetation which has to be cut must not exceed 1/3 of the total biomass. Otherwise - and if the length of the chaff is not short enough – the grass will not rot properly between the stubble, leading to an accumulation of dead organic material. If it is intended to get a grass

length of 20 cm the relevant vegetation should not be higher than 30 cm when the mowing campaign begins. For this reason it is clear why powerful equipment is necessary. The whole area has to be mown before the grass in those parts of the airfield which were mown first reaches again a height of 30 cm and more.

If there is a “shoot through” of the grass the only solution is a complete mowing of the airfield short above the ground with resulting high costs for the removal and deposition of the grass.

After three years of experience we can summarise that with the equipment mentioned above and with the necessary modifications an efficient long-grass management is possible. The operations have to be orientated on the current vegetation growth (which differs from year to year in time) and it therefore demands a flexible response of the crews maintaining the airfields. Besides being experts in the field of machinery technique they also should have some biological knowledge.

After introducing the new technique on Schleswig-Jagel airfield in 1996 the total number of bird strikes during take off and landing did not decrease significantly. Lapwings however were not longer involved in bird strikes in the years 1997 to march 2000. In the years before 36 % of the birds causing bird strikes during take off and landing were lapwings. Maybe that this reduction also depends on the decline of the lapwing populations in Europe (Bell, 1999), although local ornithologists could not confirm this for the Schleswig-Jagel area.

The ratio of gulls involved in bird strikes remained nearly the same after the introduction of the new mowing machines. Gulls also avoid areas with long grass but often use the taxiways and runway of the airfield for roosting. The optimal equipment for a long grass management is now available on Schleswig-Jagel airfield but the coming years will show which species of birds besides lapwings are influenced by tall grass.

## References

- Bell, J.C. (1999): The Effects of Changes in the Northern Lapwing Population on the Bird Strike Hazard in the UK. *Bird Strike '99*, Vancouver, 125 – 132.
- Bezzel, E. (1985): *Kompendium der Vögel Mitteleuropas. Nonpasseriformes – Nichtsingvögel*, Aula-Verlag, Wiesbaden.
- Brough, T. & C.J. Bridgeman (1980): An evaluation of long grass as a bird deterrent on British airfields. *Journal of applied Ecology*, 17, 243 – 253.
- Cramp, S. (1983): *Handbook of the Birds of Europe, the Middle East and North Africa: the birds of the Western Palearctic. Vol. 3, Waders to gulls*, Oxford University Press.

- Griebel, J. (1999): Großraumgeräte zur Grünflächenbewirtschaftung auf Bundeswehr-Flugplätzen. *Vogel und Luftverkehr*, 19, 44 – 48.
- Hild, J. (1978): About effects of agricultural and grassland use on airfields reducing bird populations. Proc. 13<sup>th</sup> Meeting Bird Strike Committee Europe, WP 14, Bern.
- Maron, J. (1977): Airport Munich II. Aspects on the economical utilisation of the airport area under consideration of the bird strike problem. Proc. 3<sup>th</sup> World Congress on Bird Hazards to Aircraft, Paris, 140-145.
- Milsom, T.P. & J.B.A. ROCHARD (1987): Lapwings and birdstrikes. CAA Paper 87015, London, 85 p.
- Seamans, T. W., R. A. Dolbeer, M. S. Carrara and R. B. Chipman (1999): Does Tall Grass Reduce Bird Numbers On Airports? Results Of Pen Test With Canada Geese And Field Trials At Two Airports, 1998. *Bird Strike '99*, Vancouver, 161 – 170.
- Weitz, H. (1983): Habitatwahl, Brut und Bruterfolg beim Kiebitz (*Vanellus vanellus*) auf intensiv landwirtschaftlich genutzten Flächen. Unpublished examination paper, Köln, 87 p.