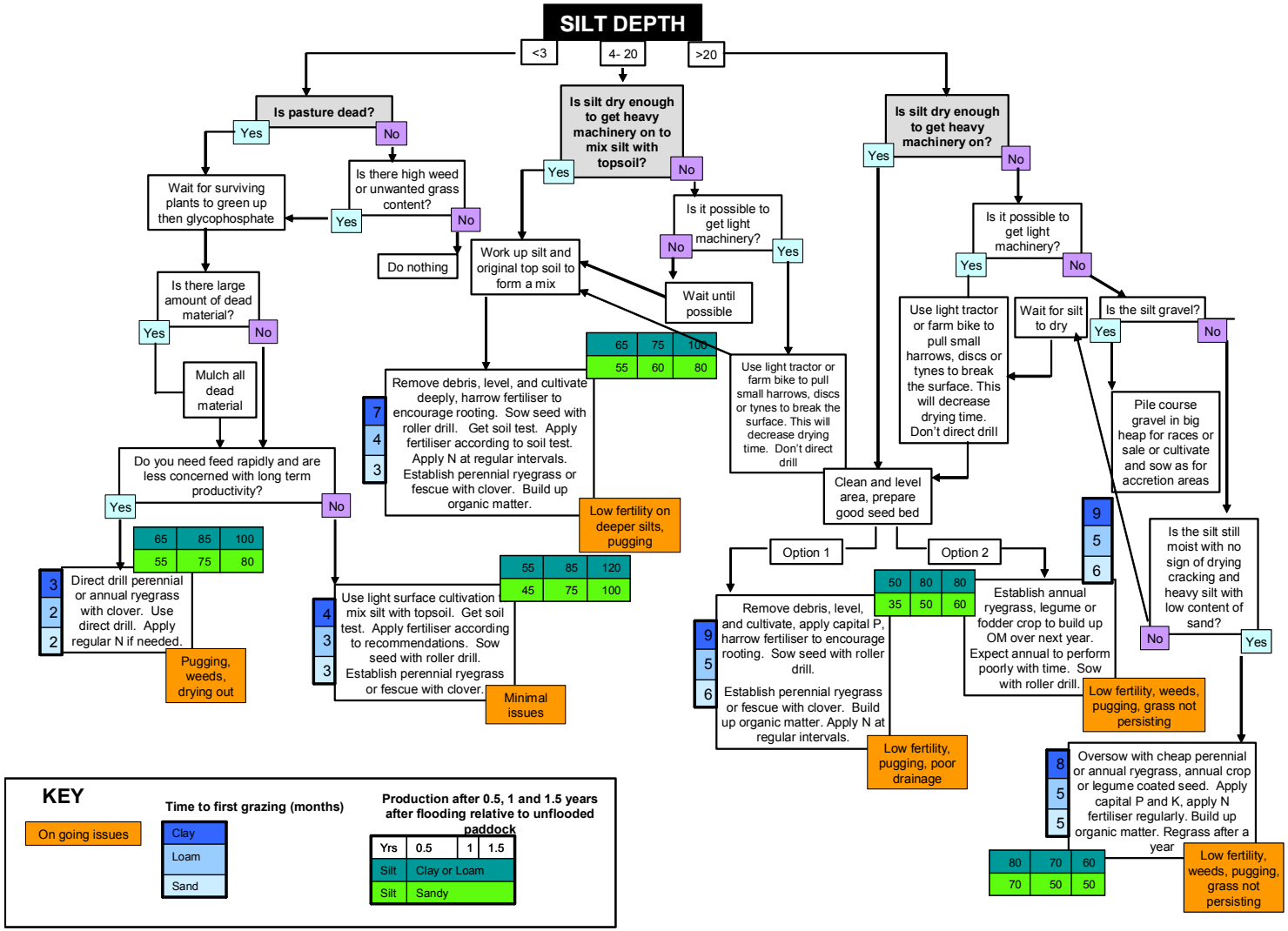
Regrassing paddocks after flood events

Lower North Combined Provincal Federated Farms Storm Group



FLOOD SEDIMENT

SNI floods 2004. In February 2004 over a 36-hour period 180ml of rain fell, leading to the multiple flooding of rivers in the region. It was estimated that approximately 20 000 ha was inundated. At the time it was found that there was little published information on the recovery of flood affected pasture and what information was available was difficult to source. In addition no systematic attempt had been made to collate farmer's experience and knowledge on regrassing flooded pastures. This document is an amalgamation of data collected at the time and data collected from 200 regrassed paddocks and the surveyed views of 104 farmers 1-2 years after the event. This is a summary designed to be of use for flood affected farmers. It is important to realise that the data contained in this document is specific to the timing of the flood and subsequent warm, moist conditions that prevailed after the SNI flood of 2004.

Sediment structure: Flood sediment characteristically lacks structure and organic matter and comes in varying textures ranging from heavy to light i.e. from clay to silty loams to sand. The clay loams are normally flat and feel smooth and silky and are usually found in ponding areas some distance from the river. The clay loams retain water for some time and if deep can't be cultivated for considerable time because machinery will bog. Silt to silty sands are often ruffled in surface texture and slightly gritty to touch. The surface of this medium flood sediment dries fairly quickly but the subsurface remains moist. Sand flood sediment is often rolling, gritty to touch and drains very rapidly and is usually adjacent to the river and may contain a lot of gravel and flood debris.

As a river floods, the coarser sand material is deposited in the higher reaches of a river and closer to the river bank and these will be of poorer quality – less fertile and less suitable for pasture growth. Further down a river and further away from the river more clay loams are deposited and, contain higher nutrient levels. These clay loams take longer to dry out but result in better pastures long-term. The immediate fertility of the clay and silt loams will be highly variable and should be tested. Silt and sand can intermingle in layers making mixing a good option. In the farmer survey data there was a delay in regrassing clay silts but their subsequent pasture establishment was superior to sandy silt.

Silt fertility: The silt washed onto your land can either be fertile material from a neighbour's farm upstream, or it could be subsoil washed from slips on steeper land. In any case it will contain very little or no organic matter, will probably have very low nitrogen (N) content, and is usually low in phosphate but high in sulphate. Sands will be the least fertile and the clay loams will be more fertile. Flood sediment pH level is normally quite different to soil. Soil tests can be taken in wet silt as the sample is dried in the laboratory. However remember that when the soil is wet less soil is collected per sample so more samples will be required. It can take up between 3-14 days to get the results back.

Soil tests taken on flood affected pastures from the SNI 2004 floods had a pH of 6.9 (range 5.8 to 7.8), organic matter 1.6% (0-3.7) Olsen P of 8 (2-21), mg/kg. There were small differences in the silt from different rivers but these differences have little practical significance. Flood sediment will need potassium and phosphate fertilisers and regular nitrogen. Efforts should be made to increase organic matter on silt affected paddocks.

Pasture damage: In the SNI 2004 floods eighty percent of flooded pastures died. Only a proportion of those under water for less than 3 days with shallow silt survived. Paddocks recently grazed before the flooding will be worse affected. If a pasture hasn't shown signs of recovery after a week then consider it to be dead. Better quality grasses and clovers will die first leaving plants with rhizomatous spreading habits – couch and browntop and creeping buttercup. Such weeds will cause problems later if left uncontrolled. Ongoing weed control may be needed.

Is the silt smelling? When river silts become smelly this indicates that toxins are present as a result of anaerobic organism activity. It is probable that seed germination after sowing directly on smelly silt will be impeded by these toxins. However recovery of the anaerobic silt following cultivation will be rapid. It is recommended that anaerobic silt be aerated or cultivated.

Plan recovery. Understand the feed requirements for the upcoming winter and following spring and summer and plan pasture recovery practices accordingly. There is little point to putting the entire flooded farm into temporary pastures to find that an identical feed pinch exists in the following spring when the pastures have to be renewed again. Assess each paddock for time under water, density of live pasture remaining after 10 days, silt type (sandy, clay/silt loam) and depth (<5 cm, 5-20, >25 cm). Using the damage information and feed requirements in the future, plan the recovery using the estimated times to grazing and expected production recovery of the paddock. Develop a time line for regrassing. Some paddocks will need immediate action while others will need to dry before cultivation. Back up plans are needed if the contractor is delayed or will only visit once e.g. is there some way to get pasture established using own machinery or that available from other farmers? However try to avoid using roller drills to direct drill or direct drill to drill seed on cultivated paddocks.

Flood sediment less than 5 cm. If there is less than 5 cm of silt and the grass has been under the water for less than 3 days then there is a 50:50 chance that the existing grass will survive and come through the crust. Existing grass recovers much more quickly than sown grass. If there are open parts in the pasture then these can be undersown using perennial grass: clover mixes. If the pasture has died then the options are direct drill or light cultivation. Light cultivation will break up the barrier between silt and the old pasture which can cause ongoing drainage problems. It will also mix the low fertile, low water holding capacity silt with fertile structured topsoil making the pasture more resilient. Direct drilling the paddock is cheaper and will reduce the time to first grazing by a month relative to cultivation. However, after 12-18 months SNI farmers and researchers found the direct drilled paddocks to be approximately 10-15% less productive than cultivated paddocks, however little difference was found by researchers at 24 months post flooding. Apply nitrogen fertiliser (N) at about 50 kg N/ha to assist recovery, either as urea (110kg/ha), or as DAP (at 275 kg/ha). Avoid using more than 25 kg N/ha down the spout if sowing seed with a drill.

Flood sediment 5-25 cm. If silt has completely covered the pasture it will not survive and will need to be regrassed. Normal cultivation

methods will apply at shallower silt in this category though heavy deep cultivating machinery will be required to bring the topsoil to the surface at the deeper silt depths. Cultivation that mixes topsoil and silt is highly recommended at these silt depths because the silt is infertile, will contain no organic matter or N, and have poor structure making it prone to pugging. A barrier to water drainage and an anaerobic layer may also occur at the interface between the old pasture and flood silt. It is better in the long term to wait until these paddocks can be cultivated. Waiting for these silts to dry sufficient to allow heavy machinery will be a problem. Sandy silts will dry quickly and heavy and medium silts more slowly. Light machinery can be used to break the surface to speed up the drying process. Level the silt in the paddock to facilitate a more even mixing of topsoil with silt. Prepare a good seedbed and sow perennial or fescue and clover with a roller drill. Seventy percent of the SNI farmers sowed perennial ryegrass with the remainder sowing Italian or perennial-italian ryegrass. The Italian ryegrasses performed poorly on the deeper silts in this range. Apply capital dressings of phosphate and potassium. Apply regular dressings of nitrogen. Get ongoing soil tests. Try to build up organic matter in the paddock by grazing supplements, topping the paddock.

Half the farmers in the SNI floods cultivated to regrass at these silt depths. Direct drilling was the next most common other practise with some oversowing but only at silt depths of greater than 10 cm (for oversowing Silts > 25 cm). The first grazing was 2, 3.5 or 6 months for broadcast, direct drilled and cultivated respectively. At 12 months the farmers assessed the productive value of the paddocks for all methods of sowing at 60-70% of unflooded paddocks, but by 18 months the assessment was 65, 85 and 100% for oversown, direct drill and cultivated respectively. Direct drilling with a roller drill was very ineffective.

Flood sediment >25cm. It is recommended that deep deep silt is cultivated once dry enough with light machinery (including small tractors) and lightly break up surface, drill forage of choice. Half the farmers in the SNI 2004 floods cultivated deep silt with the others equally split between direct drill and oversowing. The time to first grazing was 6 months for direct drilling but 7.5 months for oversowing and cultivation. The deep silts have poor production levels over an extended time period. After 18 months these deep silt had only returned to between 60-70% of their productive capacity. At two years ground cover was 15% higher on cultivated compared to minimally cultivated paddocks. Seventy % farmers sowed perennial ryegrass with the remainder using annuals and a few Italian-perrennials. Research has shown good growth from annual crops such as oats, ryecorn and annual ryegrass. Though these latter crops will require ongoing fertiliser applications to achieve good production. These crops can be, after winter grazing, mulched to aid in organic matter or made into silage in spring. If ongoing fertiliser is not planned on these deep silts then legumes only could be sown. On very sandy areas use the same seed mix as you normally use on your accretion area.

Oversowing is not an option for very sandy flood sediment but is an option for clay/silt loams. Oversowing needs to occur when the silt is still damp and sticky and must occur quickly once water has receded. Only use coated seed. Once the silt has caked and cracked it is too late for oversowing. Relying on rewetting the silt after rain to foster germination of oversown seed is not likely to work. Oversowing is a more risky sowing method than cultivation or direct drilling, so use higher than normal seeding rates. If the silt is too wet, the seed may rot, and if it is too dry then the surface of the silt will cake and crack, and the ryegrass seedlings will struggle to grow primary roots into the “new” soil. Once silt is dry seed may also blow away and birds become a major problem because they can land on the dry silt. Oversow with short-term ryegrasses. Stocking of newly sown areas should begin as soon as possible without pugging. Mulching before subsequent regrassing is a good option for building up organic matter.

Revegetating shingle will be difficult. If grazing is required within 2 years then the sand/shingle needs to removed and stacked in a big stockpile. It can then be used for races or sold. Alternatively the

area can be retired and revegetated using such things as blue lupins. However be careful not to build up seed stores of undesirable species if you are intending to regrass at a later date. Farmers had some success revegetating gravely silt with pasture but only use cheap grass seed.

Farmer experiences to come ….

***Information contributors**: This information has been compiled on behalf of Federated Farmers, MAF sustainable farming fund and Meat and Wool Innovation using information provided from research results compiled from 200 paddocks, opinions of farmers, discussion with experienced flood affected farmers, researchers from AgResearch and Massey University and rural professionals from a large number of organisations.*