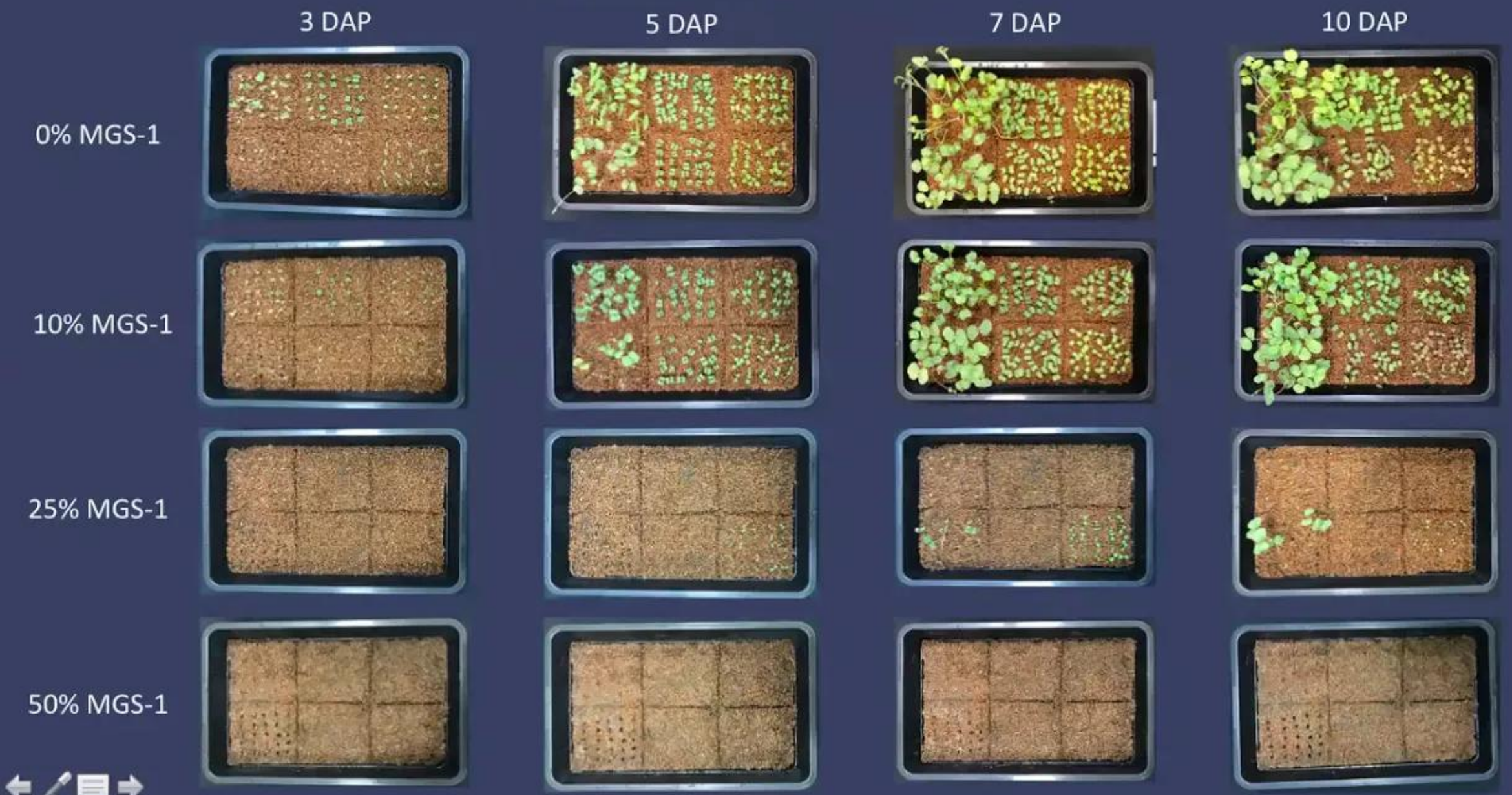
Images During Growth Period



1
00:00:04,470 --> 00:00:03,750
hello thank you for checking out my

2
00:00:06,230 --> 00:00:04,480
lightning talk

3
00:00:07,990 --> 00:00:06,240
i'm rachel tucker an undergraduate

4
00:00:09,509 --> 00:00:08,000
student at the university of florida

5
00:00:11,110 --> 00:00:09,519
and i've been studying martian regolith

6
00:00:12,470 --> 00:00:11,120
as a substrate for foreign planetary

7
00:00:14,789 --> 00:00:12,480
horticulture

8
00:00:16,470 --> 00:00:14,799
why do regular studies matter human

9
00:00:17,590 --> 00:00:16,480
space exploration is increasing in

10
00:00:19,349 --> 00:00:17,600
duration and distance

11
00:00:20,950 --> 00:00:19,359
which poses a greater need for in-situ

12
00:00:22,950 --> 00:00:20,960
resource utilization in order to

13
00:00:25,109 --> 00:00:22,960

maximize available resources

14
00:00:26,470 --> 00:00:25,119
a regolith simulant offers a comparable

15
00:00:28,470 --> 00:00:26,480
substrate in order to study the

16
00:00:30,870 --> 00:00:28,480
potential of martian regolith as a local

17
00:00:32,229 --> 00:00:30,880
resource for crop production on mars

18
00:00:33,910 --> 00:00:32,239
why do we want to look at mars global

19
00:00:35,590 --> 00:00:33,920
simulant 1.

20
00:00:36,950 --> 00:00:35,600
other martian simulants are available

21
00:00:39,190 --> 00:00:36,960
such as jsc mars 1

22
00:00:40,630 --> 00:00:39,200
and mojave mars simulink both are

23
00:00:42,869 --> 00:00:40,640
sourced from natural environments and

24
00:00:45,190 --> 00:00:42,879
have been widely studied in literature

25
00:00:46,869 --> 00:00:45,200
mars global simulant 1 is a recipe

26
00:00:49,510 --> 00:00:46,879
created by excellence labs

27
00:00:51,270 --> 00:00:49,520
to mimic the mineral chemical volatile

28
00:00:52,790 --> 00:00:51,280
and spectral properties of the rockness

29
00:00:56,150 --> 00:00:52,800
regolith at gale crater which is the

30
00:00:58,869 --> 00:00:56,160
best characterized regolith to date

31
00:00:59,189 --> 00:00:58,879
in our experiment we wanted to determine

32
00:01:02,709 --> 00:00:59,199
what

33
00:01:03,349 --> 00:01:02,719
low concentrations of the mars global

34
00:01:06,310 --> 00:01:03,359
stimulant

35
00:01:06,870 --> 00:01:06,320
how that could affect crops and so we

36
00:01:08,469 --> 00:01:06,880
tested

37
00:01:10,310 --> 00:01:08,479
three different concentrations of

38
00:01:13,830 --> 00:01:10,320

regolith relative

39
00:01:17,429 --> 00:01:13,840
to an inert arcellite substrate base

40
00:01:19,270 --> 00:01:17,439
we tested 10 25 and and 50 percent

41
00:01:20,550 --> 00:01:19,280
mars global stimulant one relative to

42
00:01:23,030 --> 00:01:20,560
the arcellite

43
00:01:24,789 --> 00:01:23,040
during growth we we collected daily

44
00:01:26,870 --> 00:01:24,799
collected data daily for

45
00:01:28,710 --> 00:01:26,880
radical emergence cotyledon emergence

46
00:01:30,870 --> 00:01:28,720
first true leaves budding

47
00:01:33,030 --> 00:01:30,880
and at 10 days after planting we

48
00:01:37,270 --> 00:01:33,040
harvested and collected fresh weight

49
00:01:39,590 --> 00:01:37,280
dry weight height and widest diameter

50
00:01:40,870 --> 00:01:39,600
we planted 25 seeds for each of the

51
00:01:43,590 --> 00:01:40,880
following cultivars

52
00:01:44,550 --> 00:01:43,600
daikon radish amara mustard extra dwarf

53
00:01:46,630 --> 00:01:44,560
bok choy

54
00:01:49,270 --> 00:01:46,640
buckwheat red russian kale and

55
00:01:52,389 --> 00:01:49,280
outrageous red romaine

56
00:01:55,590 --> 00:01:52,399
pictured here is a top view of 3

57
00:01:57,510 --> 00:01:55,600
5 7 and 10 days after planting of the

58
00:02:01,429 --> 00:01:57,520
control group in the top row

59
00:02:03,910 --> 00:02:01,439
10 25 and the 50 concentration of mars

60
00:02:06,069 --> 00:02:03,920
global stimulant

61
00:02:07,990 --> 00:02:06,079
as you can see as the concentration of

62
00:02:12,229 --> 00:02:08,000
mars global stimulant increases the

63
00:02:15,990 --> 00:02:13,750

picture here is a graph for each of the

64
00:02:17,190 --> 00:02:16,000
cultivars and the x-axis is the number

65
00:02:19,830 --> 00:02:17,200
of days after planting

66
00:02:21,110 --> 00:02:19,840
and in the y-axis is the percent of

67
00:02:22,470 --> 00:02:21,120
seeds planted

68
00:02:24,229 --> 00:02:22,480
as you can see here for radical

69
00:02:25,910 --> 00:02:24,239
emergence there was a large difference

70
00:02:27,030 --> 00:02:25,920
in each of the six cultivars between the

71
00:02:28,949 --> 00:02:27,040
tony 25

72
00:02:31,990 --> 00:02:28,959
concentration of regolith and the 50

73
00:02:36,309 --> 00:02:35,509
for cotyledon emergence in five of the

74
00:02:37,509 --> 00:02:36,319
six

75
00:02:39,430 --> 00:02:37,519
cultivars with an exception of

76
00:02:40,390 --> 00:02:39,440
outrageous red romaine there was a large

77
00:02:43,030 --> 00:02:40,400
difference between the

78
00:02:45,030 --> 00:02:43,040
10 and the 25 percent concentration of

79
00:02:46,550 --> 00:02:45,040
regolith

80
00:02:48,630 --> 00:02:46,560
and again for the first true leaves

81
00:02:49,990 --> 00:02:48,640
budding for five of the six cultivars

82
00:02:51,509 --> 00:02:50,000
the exception of the outrageous red

83
00:02:52,229 --> 00:02:51,519
romaine there's a large difference

84
00:02:55,509 --> 00:02:52,239
between

85
00:02:58,149 --> 00:02:55,519
the 25 and the 10 concentrations of the

86
00:03:01,110 --> 00:02:59,430
at harvest there was not enough

87
00:03:01,830 --> 00:03:01,120
vegetative tissue in order to collect

88
00:03:05,110 --> 00:03:01,840

data for

89
00:03:07,830 --> 00:03:05,120
the 50 concentration of regolith however

90
00:03:09,589 --> 00:03:07,840
for the 20 fresh weight for the 25

91
00:03:11,910 --> 00:03:09,599
concentration of regolith relative

92
00:03:12,710 --> 00:03:11,920
to the control group each of the six

93
00:03:14,149 --> 00:03:12,720
cultivars

94
00:03:17,030 --> 00:03:14,159
was statistically significant in

95
00:03:21,589 --> 00:03:19,910
for dry weight five of the six cultivars

96
00:03:23,030 --> 00:03:21,599
were statistically significant between

97
00:03:24,149 --> 00:03:23,040
the twenty-five percent concentration of

98
00:03:27,509 --> 00:03:24,159
burglars and the test

99
00:03:31,509 --> 00:03:29,589
for the height for the harvest data it

100
00:03:33,589 --> 00:03:31,519
was very statistically significant in

101
00:03:35,190 --> 00:03:33,599
terms of the 25 percent

102
00:03:36,630 --> 00:03:35,200
concentration of regolith in which all

103
00:03:37,509 --> 00:03:36,640
six cultivars were statistically

104
00:03:40,470 --> 00:03:37,519
significant

105
00:03:42,229 --> 00:03:40,480
and in 10 concentration of regolith five

106
00:03:43,030 --> 00:03:42,239
of the six cultivars were statistically

107
00:03:44,710 --> 00:03:43,040
significant

108
00:03:47,270 --> 00:03:44,720
and as you can see pictured here the

109
00:03:49,110 --> 00:03:47,280
extra prok choi at zero percent

110
00:03:53,830 --> 00:03:49,120
um or the control group and the 10

111
00:03:57,110 --> 00:03:56,789
diameter was also greatly affected in

112
00:04:00,229 --> 00:03:57,120
for

113
00:04:01,429 --> 00:04:00,239

all six cultivars the 25 percent

114
00:04:02,869 --> 00:04:01,439
concentration of regolith was

115
00:04:04,869 --> 00:04:02,879
statistically significant from the

116
00:04:07,190 --> 00:04:04,879
control group

117
00:04:08,309 --> 00:04:07,200
what does this mean unamended mars

118
00:04:10,869 --> 00:04:08,319
global stimulant 1

119
00:04:12,550 --> 00:04:10,879
severely inhibits vegetative crop growth

120
00:04:15,030 --> 00:04:12,560
in multiple cultivars

121
00:04:17,990 --> 00:04:15,040
and not just at 100 concentration this

122
00:04:21,349 --> 00:04:18,000
occurs at low concentrations as well

123
00:04:23,270 --> 00:04:21,359
and what this means is that this this

124
00:04:25,830 --> 00:04:23,280
regolith will need to be altered in some

125
00:04:29,189 --> 00:04:25,840
way in order to become a viable

126
00:04:31,990 --> 00:04:29,199
resource for crop growth on mars

127
00:04:32,629 --> 00:04:32,000
of course this was not done as one

128
00:04:34,710 --> 00:04:32,639
person

129
00:04:36,390 --> 00:04:34,720
science takes a lot of people and a lot

130
00:04:36,950 --> 00:04:36,400
of wonderful people contributed to this

131
00:04:39,350 --> 00:04:36,960
product